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Students' Preference Analysis on Online Learning Attributes in Industrial Engineering Education during the COVID-19 Pandemic: A Conjoint Analysis Approach for Sustainable Industrial Engineers

Ardvin Kester S. Ong [1,2], Yogi Tri Prasetyo [1,*], Michael Nayat Young [1], John Francis T. Diaz [3], Thanatorn Chuenyindee [1,2,4], Poonyawat Kusonwattana [1,2], Nattakit Yuduang [1,2,5], Reny Nadlifatin [6] and Anak Agung Ngurah Perwira Redi [7]

1 School of Industrial Engineering and Engineering Management, Mapúa University, 658 Muralla St., Intramuros, Manila 1002, Philippines; aksong@mapua.edu.ph (A.K.S.O.); mnyoung@mapua.edu.ph (M.N.Y.); thanatorn@webmail.npru.ac.th (T.C.); mr.k.poonyawat@gmail.com (P.K.); nuttakit33@gmail.com (N.Y.)
2 School of Graduate Studies, Mapúa University, 658 Muralla St., Intramuros, Manila 1002, Philippines
3 Department of Finance and Accounting, Asian Institute of Management, 123 Paseo de Roxas, Legazpi Village, Makati, Metro Manila 1229, Philippines; jdiaz@aim.edu
4 Logistics and Supply Chain Management Program, Nakhon Pathom Rajabhat University, Nakhon Pathom 73000, Thailand
5 Institute of Research and Development, Valaya Alongkorn Rajabhat University, Phahonyothim Rd., Khlong Nueng, Khlong Luang District, Pathum Thani 13180, Thailand
6 Department of Information Systems, Institut Teknologi Sepuluh Nopember, Kampus ITS Sukolilo, Surabaya 60111, Indonesia; reny.nadlifatin@gmail.com
7 Industrial Engineering Department, BINUS Graduate Program—Master of Industrial Engineering, Bina Nusantara University, Jakarta 11480, Indonesia; wira.redi@binus.edu
* Correspondence: ytprasetyo@mapua.edu.ph; Tel.: +63-(2)8247-5000 (ext. 6202)

Abstract: The decline of enrollees for industrial engineering during the COVID-19 pandemic and the increasing demand for professional industrial engineers should be explored. The purpose of this study was to determine the preference of industrial engineering students of different educational levels on online learning during the COVID-19 pandemic. Specifically, this study utilized conjoint analysis with orthogonal design considering seven attributes: delivery type, layout, term style, final requirements, Coursera requirements, seatwork and practice sets, and platforms. Among the attributes, 20 stimuli were created through SPSS and were answered voluntarily by 126 respondents utilizing a 7-point Likert Scale. The respondents were comprised of 79 undergraduate, 30 fully online master's degree, and 17 master's and doctorate degree students collected through purposive sampling. One university from the two available universities that offer all educational levels of IE in the Philippines was considered. The results showed that undergraduate students considered the final requirements with multiple-choice as the highest preference, followed by non-modular term style, and no seatwork and practice sets. In addition, fully online master's degree students considered delivery type with the mix as the highest preference, followed by layout, and no seatwork and practice sets. Finally, master's and doctorate degree students considered final requirements with publication as the highest preference, followed by no seatwork and practice sets, and mix delivery type. The students are technologically inclined, want to learn at their own pace, know where and how to get additional online learning materials, but still need the guidance of teachers/professors. The results would help contribute to the theoretical foundation for further students' preference segmentation, specifically on online learning during the COVID-19 pandemic worldwide. Moreover, the design created could be utilized for other courses in measuring students' preference for online learning even after the COVID-19 pandemic.

Keywords: online learning; industrial engineer; conjoint analysis; student's preference

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1. Introduction

Professional Industrial Engineers (IE) are currently in high demand across the world. In the United States, there are approximately 257899 industrial engineers, and the numbers are still expected to grow about 9.7% in the coming years (Figure 1) [1]. In the Philippines, ref. [2] stated that there is a 95.54% employability among engineering graduates. Specifically, the manufacturing industries growing in the Philippines demand numerous professional engineers to engage in their business. With that, ref. [3] stated that 96.23% of IE graduates are highly employed in the Philippines, but 18.83% of the 96.23% are employed internationally in places such as Papua New Guinea, USA, Malaysia, Bahrain, United Kingdome, Japan, Qatar, Dubai, Saudi Arabia, South Korea, and Singapore. These IE professionals have jobs in line with associate engineers and technical jobs, specifically in the manufacturing and telecommunication industries [3]. In addition, from the U.S. Bureau of Labor Statistics [4], the requirement to get a job as a professional industrial engineer is an undergraduate degree even without working experience. Even without working experience, the average salary per hour in 2020 was $42.76 USD ($88,950 USD median salary wage in May 2020) with 295800 jobs available. Even with these high availability jobs, it is still expected to increase about 10% in the next 10 years [4].

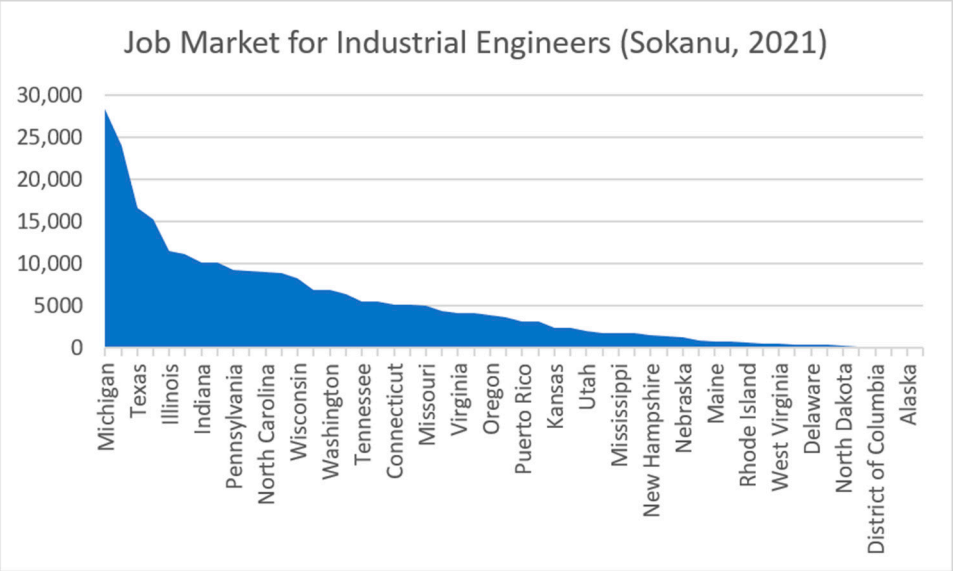

Figure 1. Job Market for Industrial Engineers [1].

Professional IE deals with logistics, manufacturing industries, service industries, wholesale trading, consulting and engineering services, and even research and development [5]. This shows that IE will be needed in any country due to their offered services. However, before anything could be applied, theories and conceptualization should be learned first in school. The application for industrial engineers means that universities should improve and develop future professionals. Ref. [5] stated that universities outside the United States adopted the curriculum and practice of IEs from the U.S. that enables graduates to have equal competencies. In addition, ref. [5] highlighted the lack of studies focusing on IE education, specifically in the Philippines. With the current fully online learning during the COVID-19 pandemic, one important consideration is the empowerment of the satisfaction of students.

The satisfaction of students should be taken into consideration for students to continue with their learning. As seen in Figure 1, job markets have been increasing and would continue to increase [1]. However, Data USA [6] showed that students of industrial engineering have decreased 3.13% during the COVID-19 pandemic. In the Philippine setting, it could be seen that online classes during the COVID-19 pandemic through the perception of students are one reason for the decline in student enrollment. This is because

the effectiveness of online classes is said to be doubtful after surveying teachers and students from different areas of the Philippines [7]. Ref. [7] also discussed how only 47% of the students are certain about their learnings in online classes and 42.7% of the parents are confident about the learnings of their children. The majority of the reasons are issues with internet connectivity [7,8]. The study of [8] in India showed that difficulties with internet connectivity are an issue for online learning initiatives. Muthuprasad et al. [8] highlighted that though convenience and flexibility are being offered in a fully online setup of learning, student's preferences, and attributes, specifically the mode of learning, should be taken into consideration to clearly encompass the measurement of learning effectivity. This would lead to student satisfaction as it is affected by the sudden shift of the educational setting. Thus, it is important for universities to acknowledge students' preferences to enhance satisfaction. This enhancement would lead to an increase in learning, interest, and academic achievement [9,10].

One way to consider students' satisfaction is to know what their preferences are. Especially during the fully online learning setup, not many studies have dealt with students' preferences. Khanal et al. [11] and Seel [12] mentioned that consideration of students' preferences is important in academic achievement because this will let students engage and process the information to be learned. During online classes especially in the COVID-19 pandemic, ref. [8] mentioned that the measurement of students' preference would help build an effective design in the curriculum of online learning. The result showed that a structured system considering recording of classes and having assessments after classes were shown to be the most preferred by students. However, ref. [8] discussed how the internet connection plays an important factor in the satisfaction of students in online classes. Thus, this affected the preference of students to be able to cope with the new normal of the education setting. In line with the results, different modes of online learning have become available throughout the COVID-19 pandemic discussed in Section 2.

Moreover, Baturay and Yukselturk [13] and Muthuprasad et al. [8] discussed the student's preference for online learning and stated that online learning has many attributes needed to be covered to relate to students' preference and achievement. One of the reasons why the students would have high academic achievement is their choice of mode and satisfaction [13]. Furthermore, Vanthournout et al. [14] stated that motivation is one of the indicators for students' success. Having their preferences on learning would increase student motivation and would eventually lead to academic success [14]. Thus, the lack of studies measuring students' preference for fully online learning should be considered.

To measure preferences, a multivariate tool called conjoint analysis is commonly utilized. Conjoint analysis measures and evaluates the complete set-up and group attribute [15–17]. Different studies utilized conjoint analysis for the educational settings. In the Philippines, evaluation of the learning experience of nurses has been considered [18]. In addition, Factor and De Guzman [19] also dealt with nurses, however, focused only on instructor preference. The result of their study showed that teachers are key attributes toward the preference of the students. Mainly, the students prefer knowledgeable teachers with experience and deliver the lesson with practical applications to enlighten them with the topic.

In Korea, Mok et al. [16] utilized conjoint analysis for a better intellectual property curriculum. In addition, Sohn and Ju [20] utilized conjoint analysis, however, they focused on recruitment in college education. Both the studies focused on how to improve the curriculum set for education in their respective universities and help develop a better perspective to gain more students using conjoint analysis.

In Nepal, Acharya and Lee [21] also utilized conjoint analysis focusing only on the perspective of e-learning in developing countries. However, all of these studies [18–21] were conducted prior to the COVID-19 pandemic, therefore, it is very important to utilize conjoint analysis in the context of online learning during the COVID-19 pandemic especially for industrial engineering education.

The purpose of this study was to determine the preference of industrial engineering students of different educational levels on online learning during the COVID-19 pandemic. Specifically, this study focused on industrial engineering and engineering management students; undergraduate students, students taking up master's degrees, and doctorate degrees. It contributes to the theoretical foundation for further students' preference segmentation. The results of this study may be utilized for students' preference segmentation on online learning during the COVID-19 pandemic worldwide.

This paper is organized as follows. Section 2 represents the methodology which mainly explained the participants and conjoint design. Section 3 represents the conjoint results for industrial engineering in three different educational levels: undergraduate, fully online master's, and regular master's and Doctor of Philosophy. Section 4 represents the in-depth discussion of the findings and the comparisons with other studies. Finally, Section 5 summarizes the study.

2. Methodology

2.1. Participants and Research Conceptualization

Due to the COVID-19 pandemic, the study was only able to consider a total of 126 students from one university under the Department of Industrial Engineering and Engineering Management (IE-EMG) presented in Table 1. Mapua University was chosen due to its world ranking [22]. Mapua University is one of the two universities offering all education levels under Industrial Engineering and Engineering Management (IE-EMG) such as undergraduate, master's degree, and Doctor of Philosophy degree across different engineering courses in the Philippines [5]. Mapua University has been consistently listed as the 4594th out of 14,178 universities in the world, 1447th of 5833 in Asia, 7th of 230 universities in the Philippines, and 3rd of the 35 universities in the country's capital [22].

Table 1. Demographics.

Education Level	Gender	N
Undergraduate Students	Male	35
	Female	44
Fully Online Master's Students	Male	18
	Female	12
Master's Students	Male	4
	Female	7
Doctorate Students	Male	5
	Female	1

In addition, since this study focused only on students taking up IE-EMG across different education levels and due to the COVID-19 pandemic, purposive sampling was utilized as a data collection technique [23]. Ref. [23] defined purposive sampling as a tool to generalize the investigated sample through consideration of a selection process. The study tried to get as many respondents for each academic level as possible. However, as the level of education increases, fewer student are available since not many universities in the Philippines offer higher than undergraduate education for IE [5]. Ref. [5] indicated that there are only two universities that offer PhD IE programs (Mapua University and De La Salle University), 12 for MS, and 91 for UG. Since this study considers BS, MS, and PhD levels, Mapua University was chosen. Specifically, the 126 students were divided into 79 undergraduate (UG) students, 30 fully online master's degree students, and 17 master's (MS) and doctorate degree (PhD) students coming from the same university. The fully online master's degree students enrolled in fully online classes from start to end of the course. Following the suggestion of Hair [24], a small-scale sampling technique could be utilized such as 50 respondents which could provide an outlook of preference among

the generalized data. Moreover, the sample may provide a variety of results and how preference is measured that could be interpreted for the preference of the population [24].

The demographics were composed of 62 males and 64 females. In addition, the respondents had experiences with both online and face-to-face classes. Sethuraman et al. [25] suggested that online distribution of the survey and due to the COVID-19 pandemic would suffice when using conjoint analysis. Therefore, this study utilized Google Forms and distributed the online survey through social media platforms to get responses among students of IE-EMG. Presented in Figure 2 are the research process and conceptualization.

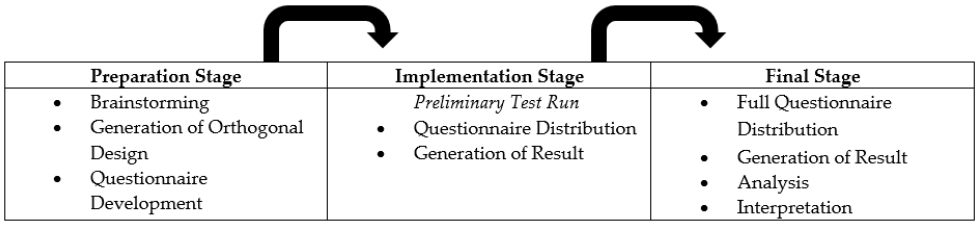

Figure 2. Research Conceptualization.

As seen in Figure 2, the preparation stage considered key attributes and levels of attributes that were identified through brainstorming. Following this was the generation of the orthogonal design through SPSS 25 to select the combination of attributes and its level adopted from [26,27]. Ref. [26] presented how the SPSS software generates the orthogonal design using conjoint analysis. Moreover, SPSS presents the minimum optimal orthogonal design available [26] and has the option to add holdouts in order to determine internal consistency among the responses [27]. With that, this software was able to generate 18 stimuli as the minimum orthogonal design with an addition of two holdouts to measure the attributes for student preference [27]. The SPSS software is also able to calculate the results of the Pearson's R correlation, Kendall's Tau, and Kendall's Tau Holdout values. Lastly, the questionnaire was created through the stimuli generated from the orthogonal design to represent each combination.

Before the full distribution of the questionnaire, a preliminary run of 30 respondents distributed among different students through purposive sampling was done. Following the suggestion of Hair [24], choice through rating could utilize the Pearson's R correlation to indicate if the attributes considered are acceptable or should be modified. Having a value close to 1.00 would dictate an acceptable orthogonal design. With that, the preliminary run was deemed successful with a Pearson's R-value of 0.936. Since the preliminary run had a close value with the cut-off, the full distribution of the questionnaire was done.

The implementation stage is composed of data collection using a Likert scale survey [24–27]. Specifically, the respondents were asked to fill out a consent form before proceeding with the survey. A 7-point Likert scale was utilized to evaluate the 20 stimuli [26]. Lastly, the final stage involved the interpretation of results by analyzing the data to develop the relative importance of each attribute considered in this study. As discussed by Hair [24], the Kendall's Tau value could be used to measure and determine internal consistency. The utilization of the Kendall's Tau should have a value higher than 0.700. This would be considered acceptable with internal consistency among the responses.

2.2. Conjoint Design

Table 2 represents the attributes considered in this study. The online learning attributes considered were the general attributes utilized during online learning. The 7 attributes considered were: Delivery Type, Template, Term Style, Final Requirement, Coursera Requirement, Seatwork and Practice Sets, and Platform.

Table 2. Attributes for Online Learning.

Attributes	Level
Delivery Type	Synchronous Asynchronous Mix
Template	Weekly Style Course Outcome Modular Style
Term Style	Non-Modular Modular
Final Requirement	Multiple Choice Exam Essay Exam 1 Conference Paper
Coursera	Yes No
Seatwork and Practice Sets	Required with Feedback None Required
Delivery Platform	Zoom Blackboard Collaborate MS Teams

The first attribute considered was the delivery type. Bellafante [28] and Bernardo [29] stated that online learning may be delivered either synchronous, asynchronous, or mixed. Synchronous is explained to be live teaching utilizing a platform for different subjects on a set schedule [30–33]. Lee et al. [34] explained asynchronous delivery is when pre-recorded lectures are uploaded to their respective platforms, and students are left to learn at their own convenient time. The mix as a level under-delivery type was also considered. This can be explained as live teaching while the class lecture is being recorded [30,35,36]. In addition, one of the purposes of the mixed delivery type is for students having internet problems. They would be able to watch the recording after the internet becomes stable.

The second attribute considered was the Blackboard template, either through weekly style, course outcome, or modular style. Figure 3 demonstrates the visual representation of the templates. The weekly layout can be considered as a folder containing the discussions done within a specific week for a specific subject. It would contain all learning materials utilized. The course outcome contains all materials utilized for the specific topic over a course of undefined time. Lastly, the modular style covers per module work students need to work on for them to acquire learning and grades for the subject. Consideration of layout is important because the online learning set-up needs the acceptance of its user to fully enhance participation [37].

The third attribute was the term style. The levels considered were non-modular and modular. Term style can be explained as the pace of learning. As stated by Hernando-Malipot [38], the non-modular term encourages students to have blended learning to fully engage learning. By having all materials available with the addition of lectures, students would have all resources available. On the other hand, the modular term style is having lectures and students would undergo an examination to measure learning.

The fourth attribute was the final requirement with the multiple-choice exams, essay exams, and 1 conference paper as the levels. Butler [39] explained a multiple-choice exam as an assessment wherein a question consists of options for the answer, but only one is correct. Meanwhile, an essay exam is when students compose explanations regarding a scenario or problem given related to the topic in order to measure learning and understanding [40]. Lastly, a conference paper is when a student must be able to create a paper with content related to the subject matter. The measurement of learning can be based on how well the details and constructs of the content are.

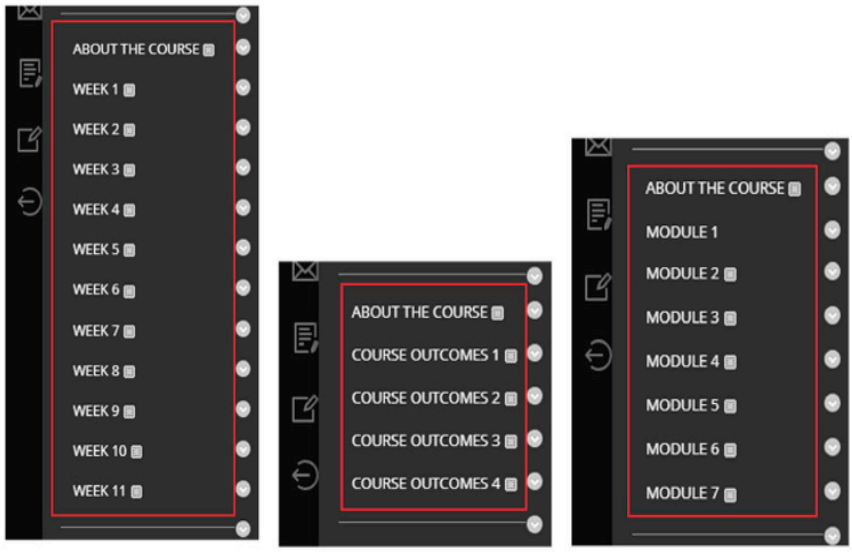

Figure 3. Blackboard template (Weekly, Course Outcome, Modular).

The fifth attribute considered was Coursera and whether students would like it (yes) or not (no). Coursera is one of the most common Massive Open Online Courses which aims to continue learning through self-paced progress [41]. Jung et al. [41] stated that through the years, the utilization of MOOCs such as Coursera has been utilized to enhance learning. Chandna et al. [42] added that the implementation of MOOCs such as Coursera to student learning is an effective and innovative concept to enhance e-learning. With that, the addition of Coursera may benefit student's learning and retention of lectures and topics.

The sixth attribute was seatwork and practice sets with levels of none required or required with feedback. This attribute is given to students to measure their learning. Kirschner et al. [43] stated that students would continue learning with the given seatwork and practice sets. This would be beneficial especially in distant learning to deepen the knowledge acquired for the topics being covered. However, preference for doing tasks would depend also on whether the students would be engaged by themselves or within a group [42–45].

The seventh attribute was the platform utilized during an online class. The levels considered were the commonly used online platforms such as Zoom [35,46,47], Blackboard Collaborate [48], or MS Teams [49].

3. Results

3.1. Undergraduate (UG) Students

Table 3 represents the utilities and the average score of importance among the online learning attributes during the COVID-19 pandemic, respectively. Specifically, this section covers results for 79 undergraduate students taking up IE-EMG. According to [24], utilities represent the judgment of an individual of their preference regarding an attribute. The higher the utility estimate, the higher the preference towards the level of attributes; and the higher the average score of importance reflects the most preferred attribute [24].

Table 4 represents the correlation of results from UG students. Ref. [24] discussed that Pearson's R is utilized to measure choice tasks that consider rating (e.g., Likert Scale). Moreover, correlation-based from Pearson's R determines the profile of all the attributes considered in the design created among all respondents. The results being close to 1.00 dictates that the combination from the utility and average score of importance may be considered acceptable [24]. It could be seen that Pearson's R-value was 0.965 which means that the orthogonal design is acceptable.

Table 3. Utilities and Importance Score for UG students.

Attributes	Preference	Utility Estimates	Std. Error	AVE Score of Importance
Delivery Type	Synchronous	−0.145	0.061	12.026
	Asynchronous	−0.002	0.070	
	Mix	0.148	0.075	
Layout	Weekly Style	−0.039	0.061	4.2890
	Course Outcome	0.066	0.074	
	Modular Style	−0.026	0.066	
Term Style	Non-Modular	0.250	0.046	20.494
	Modular	−0.250	0.046	
Final Requirement	Multiple Choice Exam	0.434	0.061	27.957
	Essay Exam	−0.248	0.070	
	1 conference paper	−0.186	0.068	
Coursera Requirement	Yes	−0.136	0.045	11.155
	No	0.136	0.045	
Seatwork and Practice Set	Required with Feedback	−0.174	0.046	14.292
	Non-required	0.174	0.046	
Delivery Platform	Zoom	0.014	0.061	9.7870
	Blackboard Interactive	0.112	0.069	
	MS Teams	−0.126	0.075	
(Constant)		4.215	0.054	

Table 4. Correlation from UG Students.

	Value	Significance
Pearson's R	0.965	0.000
Kendall's Tau	0.811	0.000
Kendall's Tau for Holdouts	1.000	

In addition, ref. [24] discussed that the addition of holdout could measure the consistency among the responses. Following [27], 2 holdouts were utilized to determine the consistency of response. This could be measured through the Kendall's Tau Holdout being close or equal to 1.00, but not exceeding the cut-off which indicates the overfitting of data. With Kendall's Tau value ($\geq$0.700) of 0.811 and Kendall's Tau Holdout to be 1.00, the results showed internal consistency [24].

Based on the result, the highest average score of importance was the final requirement/evaluation (27.96%) considering a multiple-choice exam. In line with this, ref. [50] stated that in the 21st century, evaluation becomes the most important factor in developing competence and skills among young generations. This is a way to measure the level of comprehension among students based on the lessons garnered throughout the school year [50]. In addition, the final requirement is usually posed as the highest percentage when it comes to the scoring system of the university. Moreover, refs. [51,52] indicated that students are more cautious with the final requirement as it determines the passing or failing of the subject. This supports the result of this study has the final requirement as the highest attribute considered by students. In addition, the students preference of having multiple-choice as the mode of the final requirement (0.434). Butler [39] indicated that students have a high preference for multiple-choice-based evaluation. This is because a multiple-choice evaluation contains the correct answer among the choices presented. This gives the students the liberty to narrow down the choices and have a higher chance to get the correct answers as compared to creating an essay or a conference paper [39]. As

the final requirement being an influence towards their final score, students would prefer somewhat of assurance towards getting a higher final grade, thereby passing the subject.

The second highest was the term style (20.49%) with non-modular as their choice. The pace of learning is the second-highest attribute being considered by students. From the university where the data was collected and as discussed by [38], self-paced learning corresponds to the non-modular style—higher utility score (0.250). In line with the findings of this study, ref. [52] indicated that students nowadays are highly engaged with technology, leading to the acceptance of self-paced learning due to the availability of online learning materials. Moreover, ref. [53] stated that the modular style has been seen to be less desired as it demonstrates the same pace as traditional learning. However, the current online delivery has a different impact on students' learning processes. Thus, it could be stated that the reason why non-modular was chosen by the students was because they can learn from the materials given to them and with the learning materials available online. Moreover, students would be able to learn at their own pace with fewer time constraints as compared to the modular style that considers frequent assessment and tasks submissions [52,53]—lower utility (−0.250).

The third highest was the seatwork and practice set (14.29%), wherein students preferred not to do required tasks. Linking the result towards the result from the study of [54,55], the behavior of students relates to their attitude towards their autonomy. Ref. [55] presented that the engagement of students influenced their goal of mastery. The purpose of the proposed seatwork and practice sets are for topic mastery, however, the results showed that students do not prefer to do these academic tasks. Ref. [55] dictated that the academic setting has an influence on the autonomy and perception of students. In addition, ref. [54] indicated that the interaction of students posed a great deal of influence on their ability to do academic tasks such as seatwork or practice sets. With the shift to online learning, students are left with only virtual interaction. This influenced their preference for doing the assigned academic tasks. Interestingly, in line with the previous result, students still want to learn at their own pace. It could then be implied that without interaction, the autonomy of students on doing academic tasks would solely be based on their own time/pace.

The fourth attribute was the delivery type (12.03%) with mix (synchronous with recordings) as the choice of level. In line with the discussion of [38] and the second highest attribute from the result, this justifies that students predominantly want to learn at their own pace. The mixed delivery type enables the student to be guided by their teachers and at the same time have the recordings of the lectures to be played when studying. This allows them to be able to review the lesson afterward [30–34]. This shows that students still need the guidance of the teacher and would want to have more time in learning the topics.

The fifth was the Coursera requirement (11.16%), with students choosing not to require it, while the delivery platform (9.79%) and layout (4.29%) were not considered significantly important. Taking into consideration the utilities, blackboard interactive, and course outcome layout were preferred. Interestingly, with Coursera being available, students still do not prefer utilizing it as part of the requirement. As indicated by [41,42], Coursera gives additional information and materials to students with their courses. However, ref. [56] discussed a lot of flaws with regards to how Coursera runs; like the peer review assessments not being timely and not everyone being equipped to give correct feedback. Another reason is that English as the main language utilized may not be functional for everyone, causing challenges for the user or the peer reviewer. The variability of feedbacking and lack of feedback on feedback was also seen as a challenge among the users [56]. This may have driven students to dislike utilizing Coursera as part of the requirement since they do not have any control of what may happen with their output. Base on the previous results, students have the capability to utilize technology in the search for the online learning materials they need [50] and are still willing to learn but with their own control and pace.

3.2. Fully Online Master's Students (FMS)

Table 5 represents the utilities and the average score of importance for fully online master's students taking up IE-EMG. Specifically, this section covers results for 30 fully online master's degree students.

Table 5. Utilities and Importance Score for FMS students.

Attributes	Preference	Utility Estimates	Std. Error	AVE Score of Importance
Delivery Type	Synchronous	−0.044	0.081	14.563
	Asynchronous	−0.112	0.093	
	Mix	0.156	0.100	
Layout	Weekly Style	−0.020	0.081	7.5270
	Course Outcome	−0.059	0.099	
	Modular Style	0.079	0.088	
Term Style	Non-Modular	0.061	0.062	6.6610
	Modular	−0.061	0.062	
Final Requirement	Multiple Choice Exam	−0.115	0.082	29.702
	Essay Exam	−0.216	0.093	
	1 conference paper	0.330	0.091	
Coursera Requirement	Yes	−0.092	0.061	10.027
	No	0.092	0.061	
Seatwork and Practice Set	Required with Feedback	−0.167	0.061	18.163
	Non-required	0.167	0.061	
Delivery Platform	Zoom	0.140	0.081	13.356
	Blackboard Interactive	−0.106	0.093	
	MS Teams	−0.034	0.100	
(Constant)		4.215	0.072	

For FMS, the highest average score of importance was the final requirement (29.70%) considering 1 conference paper. Same with the previous result among UG students, a final requirement was the highest. Following [51,52], the final requirement would dictate the passing or failing of a subject. However, the requirement for passing the course would be to submit and get accepted in a conference with an original paper. This justifies why FMS considers the final requirement as the highest attribute.

The second highest was the seatwork and practice set (18.16%) with non-required. Following this was the delivery type (14.56%). The students chose a mixed delivery type. Based on the result, FMS are aligned with the UG students following [38,54,55]. Based on the students' profiles. FMS students are in the working class, enrolling in the master's degree program of IE-EMG. The mixed delivery type would enable students to have a recap of the lesson that they could probably miss due to work [30–34]. In addition, ref. [57] indicated that working longer hours for full-time jobs while studying would have a negative effect on the academic performance of a student. Moreover, ref. [58] stated that the increase of work would reduce the credit being obtained by students. This justifies why FMS would rather have no required additional academic work like seatwork or practice set. In addition, this also relates to the fifth attribute chosen about the Coursera requirement (10.03%), with students choosing not to require it as an additional task.

The fourth highest attribute was the delivery platform (13.36%) with Zoom as the choice of level. In the university that the FMS enrolled in, their email address is linked to their profile that contains personal information. Though their email addresses are secured and are only utilized for log-in purposes, some platforms may be more highly secured when compared to others. Refs. [35,46–48] discussed how Zoom and Blackboard Interactive (BBI) has a high level of security. Since the FMS are in the working class and are more

sensitive to their profile and information, security is highly considered. As indicated by [35,46,47], Zoom is a platform that can accommodate students through invites and the moderator can choose to accept and decline attendees. With high-security features, this justifies why FMS would highly prefer Zoom (0.140) compared to BBI and MS Teams.

Lastly, the layout (7.53%) and term style (6.66%) were not considered significantly important. Taking into consideration the utilities, modular style layout and non-modular term style were preferred. To further evaluate the result, Table 6 presents the correlation of the results. It could be seen that Pearson's R-value was 0.922, indicating that the attributes are highly correlated among responses [24]. In addition, with Kendall's Tau value of 0.727 (greater than the cut-off, 0.70 [24]) and Kendall's Tau Holdout value of 1.00, internal consistency is evident among the responses gathered [24].

Table 6. Correlation.

	Value	Significance
Pearson's R	0.922	0.000
Kendall's Tau	0.727	0.000
Kendall's Tau for Holdouts	1.000	

3.3. Master's Degree and Doctorate Degree (MDD) Students

Table 7 presents the utilities and the average score of importance among MDD students. There were 11 master's degree and six doctorate degree students who voluntarily participated in this study. Lastly, Table 8 presents the statistical result of the study. Based on Pearson's R, it shows a strong correlation with a value of 0.888 (≥0.700) [24]. Moreover, Kendall's Tau is 0.888 and Kendall's Tau holdout value is 1.00—showing internal consistency among the response of MDD students [24].

Table 7. Utilities and Importance Score for MDD students.

Attributes	Preference	Utility Estimates	Std. Error	AVE Score of Importance
Delivery Type	Synchronous	−0.261	0.045	47.691
	Asynchronous	0.105	0.052	
	Mix	0.156	0.055	
Layout	Weekly Style	−0.073	0.045	20.767
	Course Outcome	0.108	0.055	
	Modular Style	−0.035	0.049	
Term Style	Non–Modular	0.007	0.034	1.6160
	Modular	−0.007	0.034	
Final Requirement	Multiple Choice Exam	0.021	0.045	4.8150
	Essay Exam	−0.021	0.052	
	1 conference paper	−0.001	0.050	
Coursera Requirement	Yes	−0.011	0.034	2.5420
	No	0.011	0.034	
Seatwork and Practice Set	Required with Feedback	−0.057	0.034	13.086
	Non–required	0.057	0.034	
Delivery Platform	Zoom	−0.017	0.045	9.4830
	Blackboard Interactive	0.050	0.051	
	MS Teams	−0.033	0.055	
(Constant)		4.801	0.040	

Table 8. Correlation.

	Value	Significance
Pearson's R	0.888	0.000
Kendall's Tau	0.888	0.000
Kendall's Tau for Holdouts	1.000	

It was seen that MDD students considered the delivery type (47.69%) as the highest attribute, specifically mixed (0.156) or asynchronous (0.105). In relation to FMS and UG, MDD students had the least preference towards term style (1.62%) with close utilities of non-modular (0.007) and modular (−0.007). Students of MDD are also within the working class like FMS. As discussed, students would want to recall the lecture materials via the recordings after the class [38,54,55]. Moreover, based on the profile of students, they come from different countries in Asia. Some of the students are from Thailand and the Philippines. The different time zones made it difficult for students to consider the synchronous delivery type.

The second highest was the layout (20.77%) with course outcome as their choice. Mohammadi [59] and Cidral et al. [60] discussed how a system should be flexible, efficient, highly responsive, and have high functionality for students to appreciate the layout. The clarity of content and materials, their placement, and compilation should also be taken into consideration for students to appreciate and utilize it with ease [61]. As seen from the level considered, the weekly layout is not sufficient for the overall qualification to be appreciated by the students. The weekly layout considers the inclusion of learning materials per folder of weeks when they were discussed. Compared to the course outcome layout, the learning materials are concise and are arranged per topic rather than when it was discussed. This, therefore, is less confusing among students, thus the preference on course outcome layout.

The third highest attribute was the seatwork and practice sets (13.09%). The students chose not to require tasks. Compared to UG and FMS, this attribute is considered the same level. All students do not want to include seatwork and practice sets. In line with this, the Coursera requirement (2.54%) was also not preferred by MDD students. As students in the working class, it became evident that these students would have difficulty managing additional academic tasks while working full time [30–34,57]. In line with that, MDD like FMS considered the delivery platform as the fourth attribute for preference (9.483%). BBI was chosen (0.050) followed by Zoom (−0.017). Ref. [48] discussed how BBI has strong security features and [62] discussed the functionality of BBI. In line with the second-highest attribute, MDD would prefer a more flexible and concise system. BBI is the main platform utilized during online classes by the university. Having BBI as the only system wherein classes are held, materials are uploaded, and submissions are done would be appreciated by the students [60,61]. Ref. [62] discussed how students accept the features and functionality of BBI. Thus, this led to the preference of MDD students.

The fifth attribute had a low significant score for the final requirement (4.8150%) considering the utilities being close to one another. Interestingly, the essay exam posed as the lowest utility considered (−0.021), followed by conference (−0.001), and the multiple-choice exam was the highest (0.021). Like FMS, the students were already oriented upon enrollment that the requirement is to present a conference paper to complete the course; in addition, have SCI/SSCI publications. Interestingly, MDD students considered this as not a priority among other attributes. Shaw et al. [63] evaluated the perception of students upon knowing the curriculum. The results indicated that when students knew what needed to be accomplished, that provided them a positive engagement towards the experience. This supports the result of this study. The students knowing what needs to be done to finish the requirements added to the acceptance of the curriculum. Moreover, ref. [64] discussed how students with a perception of what needs to be learned and done would eventually lead to positive academic achievement. Thus, students knowing how the curriculum is set throughout the course led to acceptance.

4. Discussion

Table 9 represents the comparisons between the three groups. The different attributes were ranked according to the perceived preference of students coming from different education levels taking up industrial engineering and engineering management. The first rank was the highest perceived importance while the seventh rank was the lowest score of importance.

Table 9. Comparison between three groups.

Rank	Undergraduate Degree Students	Fully Online Master's Degree Students	Master's and Doctorate Degree Students
1st	Final Requirement (Multiple Choice)	Delivery Type (Mix)	Final Requirement (Publication)
2nd	Term Style (Non-Modular)	Layout (Course Outcome)	Seatwork and Practice Set (None Required)
3rd	Seatwork and Practice Set (None Required)	Seatwork and Practice Set (None Required)	Delivery Type (Mix)
4th	Delivery Type (Mix)	Platform (Blackboard Interactive)	Platform (Zoom)
5th	Coursera (Not Required)	Final Requirement (Multiple Choice)	Coursera (Not Required)
6th	Platform (Blackboard Interactive)	Coursera (Not Required)	Layout (Module)
7th	Layout (Course Outcome)	Term Style (Non-Modular)	Term Style (Non-Modular)

Undergraduate students taking up industrial engineering courses placed the most priority on the final requirement. They would prefer a multiple-choice exam (0.434) rather than a publication (−0.186) and least preferred an essay exam (−0.248). The current generation is given the final requirements as the most important measurement of knowledge [50–53]. In addition, Albay and Eisma [50] discussed that final requirements are important for students to develop their skills by measuring the learnings they have acquired. In support of the multiple-choice exam, Butler [39] highlighted that it would be easier for students to obtain a high grade with questions given the options of correct answers already. Based on the results, the undergraduate students would tend to focus on passing the subject. This is because knowing that one of the options is the correct answer, students would tend to do strategic guessing to narrow the choices.

Moreover, fully online master's degree students considered the delivery type as the most preferred. The profile of the students places them all in the working class. As indicated by [51,52], these students are more focused on how the lessons are delivered as their understanding and knowledge would dictate their passing of failing the course. This provides insight that working students want to learn and may apply their learnings in their careers [30–34]. They deal more with what they can learn rather than any other attribute as seen from the priority of attributes. Fully online master's degree ranked final requirements attribute fifth. This is because they want to focus more on learning, and modular or non-modular were stated to be not important [30–34]. What fully online master's degree students also want to consider are flexibility and more learnings [59,60]. On the other hand, master's degree and doctorate degree students placed final requirements as the highest attribute with publication as the highest level (0.330). Aside from being a requirement to finish the course, students feel that being able to apply learnings through creating journals is one way to measure learnings [63,64].

Following the second-highest rank among undergraduate students, term style with non-modular (0.250) style is the preferred level compared to modular (−0.250). Hernando-Malipot [38] stated that the non-modular style gives the student all resources for them to learn. Based on the result, students would like to have discussions. In addition, to have all materials they might need in learning the topics. Self-paced learning is also allocated with the modular term style [38]. This means students may or may not attend

classes and they have recorded lectures for them to learn at their own convenient time. As discussed by [52], the current generation is technologically inclined. This led to the self-paced learning students want with the availability of online learning materials for their disposal. The modular style was less desired as for how the current full online learning should be delivered compared to the traditional learning style [53]. This had a huge impact on the learning process of students. From the results, it could be seen that students tended to prefer non-modular learning which is indicated to have fewer assessments and time constraints compared to modular style [52,53].

Fully online master's degree students placed the layout as their second highest with course outcome as the highest level (0.108), followed by module style (−0.035), and weekly style as the least preferred (−0.073). Course outcome layout created incorporated all resources focusing only on one topic, therefore bringing clarity. Refs. [59,60] discussed how students would accept a system that has flexibility, high functionality, is easy to navigate, and has a high response rate. Moreover, ref. [61] indicated that the placement of materials, compilation, and clarity would lead to the acceptance of a system. Justified by [62], BBI is a system widely utilized in the Philippines during online classes, and that students deemed the system acceptable. This also justifies why UG and MDD students preferred BBI over Zoom and MS Teams for the platform. For the weekly layout, all materials discussed during a specific week are uploaded in the respective folder regardless of the topics being covered. As indicated by [61], clarity with ease of navigation [59,60] plays an important role in students' acceptance. The course outcome layout contains materials specific to the topic being discussed regardless of when they were discussed. This was seen to be more preferred due to the clarity of content.

Following the third attribute, not requiring seatwork and practice sets (0.057) than required (−0.057) was preferred by UG students. In addition, master's degree and doctorate degree students highlighted that not requiring seatwork and practice sets are their preference (0.167) rather than required (−0.167). Moreover, it was seen that requiring Coursera was not preferred by the students. Zhu et al. [65] stated that feedback from students' work would be beneficial. This would help students become engaged, learn more, and understand the lesson at hand. Therefore, removal of seatwork and practice setting would not be recommended even if students prefer not to have it. Moreover, FMS and MDD students are in the working class. As discussed by [57], working full time and being students would cause a negative impact on academic performance. The increase in academic workload and job workload would influence their performance [58]. This would lead to difficulty among students. However, as additional learning, these should not be removed. Rather, the assigned academic task may be more concise to include only what is only needed for students to encompass the learnings needed, so that it may not become a burden.

Ref. [57] indicated that working longer hours for full-time jobs while studying would have a negative effect on the academic performance of a student. Moreover, ref. [58] stated that the increase of work would reduce the credit being obtained by students. This justifies why FMS would rather have no required additional academic work like seatwork or practice sets. In addition, this also relates to the fifth attribute chosen about Coursera requirements (10.03%), with students choosing not to require it as an additional task.

The fourth-ranked attribute by undergraduate students was having mixed delivery type (0.148) rather than asynchronous (−0.002) and synchronous was the least preferred (−0.145). Noticing that mixed delivery type and asynchronous delivery type were preferred, this shows that students would really want to learn at their own pace [66]. Supported by the study of Aghababaeian et al. [35], the result of the study showed no significant impact on the students' performance when a mixed or asynchronous delivery type is implemented. Additionally, most of the respondents of this study came from the Philippines. The Philippines is said to be ranked 32nd among the Asian countries with internet speed. This shows that the internet is very slow in the Philippines [67]. For students to review at their own pace, re-watch the lectures, and learn, mixed or asynchronous delivery type is preferred.

The incorporation of Coursera was the fifth attribute considered by undergraduate students. Students prefer not to have it incorporated (0.136) than considered in their learning (−0.136). The result can be supported by the findings of Julia et al. [68] wherein they stated that MOOCs such as Coursera lack the guidance and instructions for different activities needed to complete the course. Moreover, Asli et al. [69] highlighted that interaction should also take place for students to be engaged. With that, Kim et al. [70] stated that for MOOCs such as Coursera to be effective, students' commitment would be, at best, interested. The interest of students should be captured for them to be engaged, further utilize Coursera, and learn more with added materials. Moreover, this was one of the lowest attributes (5th) considered by master's degree and doctorate degree students. They also preferred not to have Coursera (0.092) rather than to have it required (−0.092).

The sixth attribute considered by the undergraduate students was the platform with Blackboard Interactive (BBI) as the most preferred (0.112), followed by Zoom (0.014), and MS Teams as the least preferred (−0.126). Zoom and BBI were considered since these platforms have a high level of security [34,46]. It could be seen that students preferred high security when their personal details are being utilized. This is because their personal information is available with the use of their email address. Considering master's and doctorate degree students, the platform ranked fourth (utilize Zoom or BBI) indicating that security as the key feature was considered.

Based on the result, it could be deduced that undergraduate students would want to finish their course as fast as possible. As supported by the U.S. Bureau of Labor Statistics [3], undergraduate students can already find a suitable and sustainable occupation even without working experience. On the other hand, fully online master's degree students would prefer to focus on learning as much as they can, having delivery type as their preferred attribute. Lastly, master's degree and doctorate degree students focus more on the learning and requirements needed for them to finish the degree. Publication as the priority highlights having a mixed delivery type because of the different time zones students live in.

4.1. Theoretical and Practical Contribution

Considering that this study is the first study that determines the online learning attributes of students during the COVID-19 pandemic, the findings of this study can be a foundation in determining students' preference in online learning. Moreover, this study can be a basis to enhance students' satisfaction when preference is addressed. The results could be applicable not only to industrial engineering students but to other courses as well.

Based on the result of this study, further exploration when it comes to students' satisfaction and motivation to academics in relation to performance may be considered. The approach utilized could be beneficial to universities considering the preference of students when it comes to online learning. In addition, it is evident that online learning and traditional learning are different. However, online learning has been utilized even before the COVID-19 pandemic started. Therefore, the results of this study could be utilized when offering online learning even after the COVID-19 pandemic. Alongside traditional learning, universities may offer both to increase the number of enrollees, thereby increasing profit. Lastly, the segmentation of different educational levels may also be incorporated during the marketing of the fully online learning offering.

The focus on the delivery type (mix), platform, and layout being utilized in online learning should be the focus of universities. This is because online learning may include studies from different countries, ergo, different time zones and security when learning online. From a marketing standpoint, universities may strategize on scheduling and delivery to enhance promotion even in other countries to engage more enrollees.

4.2. Limitations

Despite the substantial and practical contributions, there are several limitations while generalizing the study's current findings. First, due to the pandemic and the availability

of universities that offers undergraduate, master's, and PhD programs in the Philippines, this study was only able to collect a small number of respondents. It is recommended to evaluate the orthogonal design created among IE-EMG students with a higher number of respondents. Second, the study only focused on preference and did not consider performance. Future studies may combine preference and performance by utilizing Structural Equation Modeling to have a holistic result. Third, this study only focused on industrial engineers. Studies may also compare other courses that continue with online learning. This may strengthen how online learning should be delivered. Lastly, this study was conducted during the COVID-19 pandemic. Though the respondents were able to experience both traditional learning and online learning, the situation left them with no other choice for preference. Therefore, it is recommended to conduct the study after the COVID-19 pandemic when both traditional learning and online learning are offered.

5. Conclusions

The number of industrial engineering students was seen to decline, however the need for professional industrial engineers continues to rise. In the next 10 years, the need for industrial engineers is expected to increase. With the current fully online classes, there is a need to explore the preference of IE-EMG students. In line with this, the purpose of this study aimed to determine the preference of IE-EMG students for online classes during the COVID-19 pandemic. The utilization of conjoint analysis with the orthogonal design was utilized to determine the preference of IE-EMG students.

The utilization of seven attributes such as delivery type, layout, term style, final requirements, Coursera requirements, seatwork and practice sets, and platforms were considered. A total of 126 respondents coming from different educational levels of one university in the Philippines was considered. Only two universities in the Philippines offer undergraduate to Doctor of Philosophy under IE-EMG, namely Mapua University and De La Salle University [71,72]. Due to the COVID-19 pandemic, purposive sampling from Mapua University was considered in this study. Specifically, the respondents were comprised of 79 undergraduate, 30 fully online master's degree, and 17 master's and doctorate degree students. The 126 respondents who voluntarily answered an online survey distributed through social media answered a 7-point Likert Scale of the 20 stimuli created from SPSS with two holdouts.

Results showed that undergraduate students considered the final requirement with multiple-choice as the highest preference, followed by non-modular term style, and no seatwork and practice set required. Based on the results, it could be deduced that undergraduate students are technologically inclined, leading to learning at their own pace, needs the guidance of teachers/professors, and are cautious with their grades to pass the course.

In addition, fully online master's degree students considered delivery type with the mix as the highest preference, followed by course outcome layout, and no seatwork and practice set required. Fully online master's degree students would prefer to focus on learning as much as they can, having delivery type as their preferred attribute. Moreover, FMS students would prefer having high security of platforms utilized, clarity in the system being utilized, and having as little an academic workload as possible.

Lastly, master's degree and doctorate degree students considered final requirements with publication as the highest preference, followed by no seatwork and practice set, and mix delivery type. Publication as the priority highlights having a mixed delivery type because of the different time zones students live in. Students' knowing what needs to be done would lead to positive academic achievement [73].

Results of this study may be used for the application of online learning among other courses across different countries. Furthermore, this can promote the diversity of universities to offer online learning together with traditional learning when the pandemic ends. After implementation, future researchers could evaluate the effect of students' preference on their academic achievement by correlation of performance and grades. Different factors may also be included to measure the comprehensive performance of students using struc-

tural equation modeling. Lastly, the evaluation of other courses may promote variation across the delivery of online classes that may be preferred by students. Taking students as customers would lead to satisfaction and retention.

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References

1. Sokanu. The Job Market for Industrial Engineers in the United States. Career Explorer, 2021. Available online: https://www.careerexplorer.com/careers/industrial-engineer/job-market/ (accessed on 2 March 2021).
2. Chavez, N.H.; Camello, N.C.; Dotong, C.I.; Pamplona, M.A. Employability of Engineering Graduates from 2013 to 2015 as a Basis for a Proposed Student Development Program. *Asia Pac. J. Multidiscip. Res.* **2017**, *5*, 155–166. Available online: http://www.apjmr.com/wp-content/uploads/2017/03/APJMR-2017.5.1.2.16.pdf (accessed on 2 July 2021).
3. Dotong, C.I.; Chavez, N.H.; Camello, N.C.; De Castro, E.L.; Prenda, M.T.; Laguador, J. Tracer Study of Engineering Graduates of One Higher Education Institution in the Philippines for Academic Year 2009–2012. *Eur. J. Eng. Technol.* **2016**, *4*, 26–39. Available online: https://research.lpubatangas.edu.ph/wp-content/uploads/2016/07/EJET-Tracer-Study-of-Engineering-Graduates.pdf (accessed on 2 July 2021).
4. U.S. Bureau of Labor Statistics. Industrial Engineers. 2021. Available online: https://www.bls.gov/ooh/architecture-and-engineering/industrial-engineers.htm (accessed on 2 March 2021).
5. Robielos, R.A.; Chiuhsiang, J.L.; Prasetyo, Y.T. Industrial Engineering Education in the Philippines: Issues and Concerns. In Proceedings of the 2nd African International Conference on Industrial Engineering and Operations Management, Harare, Zimbabwe, 7–10 December 2020; pp. 3261–3268. Available online: http://www.ieomsociety.org/harare2020/papers/721.pdf (accessed on 2 July 2021).
6. Data USA. COVID-19 in Numbers. Data USA: Industrial Engineers. 2021. Available online: https://datausa.io/profile/cip/industrial-engineering (accessed on 4 March 2021).
7. Bernardo, J. Survey: Majority of Teachers Doubt if Distance Learning Effective. *ABS-CBN News*. 17 February 2021. Available online: https://news.abs-cbn.com/news/02/17/21/survey-majority-of-teachers-doubt-if-distance-learning-effective (accessed on 2 July 2021).
8. Muthuprasad, T.; Aiswarya, S.; Aditya, K.S.; Jha, G.K. Students' perception and preference for online education in India during the COVID-19 pandemic. *Soc. Sci. Humanit. Open* **2021**, *3*, 100101. [CrossRef] [PubMed]
9. Pham, L.; Trung, B.K.; Limbu, Y.B.; Nguyen, H.T. Does e-learning service quality influence e-learning student satisfaction and loyalty? Evidence from Vietnam. *Int. J. Educ. Technol. High. Educ.* **2019**, *16*, 7. [CrossRef]
10. Xiao, J.; Wilkins, S. The effects of lecturer commitment on student perceptions of teaching quality and student satisfaction in Chinese higher education. *J. High. Educ. Policy Manag.* **2015**, *37*, 98–110. [CrossRef]
11. Khanal, L.; Giri, J.; Shah, S.; Koirala, S.; Rimal, J. Influence of learning-style preferences in academic performance in the subject of human anatomy: An institution-based study among preclinical medical students. *Adv. Med. Educ. Pract.* **2019**, *10*, 343–355. [CrossRef]
12. Seel, N.M. Preferences in Learning and Achievement. In *Encyclopedia of the Sciences of Learning*; Springer: Boston, MA, USA, 2012. [CrossRef]

13. Baturay, M.H.; Yukselturk, E. The Role of Online Education Preference on Student's Achievement. *Turk. Online J. Distance Educ.* **2015**, *16*, 1. Available online: https://files.eric.ed.gov/fulltext/EJ1092845.pdf (accessed on 10 March 2021). [CrossRef]
14. Vanthournout, G.; Gilbels, D.; Coertjens, L.; Donche, V.; Van Petegem, P. Student's Persistence and Academic Success in a First-Year Professional Bachelor Program: The Influence of Students' Learning Stategies and Academic Motivation. *Educ. Res. Int.* **2012**, *2012*, 152747. [CrossRef]
15. Moore, W.L. A cross-validity comparison of rating-based and choice-based conjoint analysis models. *Int. J. Res. Mark.* **2004**, *21*, 299–312. [CrossRef]
16. Mok, M.S.; Sohn, S.Y.; Ju, Y.H. Conjoint analysis for intellectual property education. *World Pat. Inf.* **2010**, *32*, 129–134. [CrossRef]
17. Louviere, J.; Flynn, T.; Carson, R. Discrete Choice Experiments are Not Conjoint Analysis. *J. Choice Model.* **2010**, *3*, 57–72. [CrossRef]
18. Macindo, J.R.B.; Danganan, M.P.B.; Soriano, C.A.F.; Kho, N.S.R.; Bongar, M.V.V. A conjoint analysis of the acute and critical care experiential learning preferences of Baccalaureate student nurses. *Nurse Educ. Pract.* **2019**, *36*, 125–131. [CrossRef]
19. Factor, E.M.R.; de Guzman, A.B. Explicating Filipino student nurses' preferences of clinical instructors' attributes: A conjoint analysis. *Nurse Educ. Today* **2017**, *55*, 122–127. [CrossRef]
20. Sohn, S.Y.; Ju, Y.H. Conjoint analysis for recruiting high quality students for college education. *Expert Syst. Appl.* **2010**, *37*, 3777–3783. [CrossRef]
21. Acharaya, B.; Lee, J. User's perspective on the adaptation of e-learning in developing countries: The case of Nepal with a conjoint-based discrete choice approach. *Telemat. Inform.* **2018**, *35*, 1733–1743. [CrossRef]
22. Edurank.org. University Ranking. 2021. Available online: https://edurank.org/uni/mapua-university/ (accessed on 2 July 2021).
23. Sharma, G. Pros and cons of different sampling techniques. *Int. J. Appl. Res.* **2017**, *3*, 749–752. Available online: https://www.allresearchjournal.com/archives/2017/vol3issue7/PartK/3-7-69-542.pdf (accessed on 2 July 2021).
24. Hair, J.F. *Multivariate Data Analysis: A Global Perspective*; Pearson: Upper Saddle River, NJ, USA, 2010.
25. Sethuraman, R.; Kerin, R.A.; Cron, W.L. A field study comparing online and offline data collection methods for identifying product attribute preferences using conjoint analysis. *J. Bus. Res.* **2005**, *58*, 602–610. [CrossRef]
26. Kuzmanovic, M.; Martic, M.; Vujosevic, M.; Panic, B. Construction of efficient conjoint experimental design using MCON procedure. *Int. J. Phys. Sci.* **2011**, *6*, 5659–5670. Available online: https://academicjournals.org/journal/IJPS/article-full-text-pdf/7E0ED3F23273 (accessed on 2 July 2021).
27. Ong, A.K.S.; Prasetyo, Y.T.; Libiran, M.A.D.C.; Lontoc, Y.M.A.; Lunaria, J.A.V.; Manalo, A.M.; Miraja, B.A.; Young, M.N.; Chuenyindee, T.; Persada, S.F.; et al. Consumer Preference Analysis on Attributes of Milk Tea: A Conjoint Analysis Approach. *Foods* **2021**, *10*, 1382. [CrossRef]
28. Bellafante, G. Are We Losing a Generation of Children to Remote Learning? *The New York Times*, 9 November 2020.
29. Bernardo, J. DepEd Clarifies: 8-Hour Online Classes Just a Suggestion. *ABS-CBN News*, 18 August 2020.
30. Yang, J.; Yu, H.; Chen, N.-S. Using blended synchronous classroom approach to promote learning performance in rural area. *Comput. Educ.* **2019**, *141*, 103619. [CrossRef]
31. Wolverton, C.C. Utilizing synchronous discussions to create an engaged classroom in online executive education. *Int. J. Manag. Educ.* **2018**, *16*, 239–244. [CrossRef]
32. Jan, A. A phenomenological study of synchronous teaching during COVID-19: A case of an international school in Malaysia. *Soc. Sci. Humanit. Open* **2020**, *2*, 100084. [CrossRef]
33. Besser, A.; Lotem, S.; Zeigler-Hill, V. Psychological Stress and Vocal Symptoms among University Professors in Israel: Implications of the Shift to Online Synchronous Teaching during the COVID-19 Pandemic. *J. Voice* **2020**, in press. [CrossRef] [PubMed]
34. Lee, D.; Rothstein, R.; Dunford, A.; Berger, E.; Rhoads, J.F.; DeBoer, J. "Connecting online": The structure and content of students' asynchronous online networks in a blended engineering class. *Comput. Educ.* **2021**, *163*, 104082. [CrossRef]
35. Aghababaeian, H.; Araghi Ahvazi, L.; Moosavi, A.; Ahmadi Mazhin, S.; Tahery, N.; Nouri, M.; Kiarsi, M.; Kalani, L. Triage live lecture versus triage video podcast in pre-hospital students' education. *Afr. J. Emerg. Med.* **2019**, *9*, 81–86. [CrossRef]
36. Lapitan, L.D.; Tiangco, C.E.; Sumalinog, D.A.G.; Sabarillo, N.S.; Diaz, J.M. An Effective Blended Online Teaching and Learning Strategy during the COVID-19 Pandemic. *Educ. Chem. Eng.* **2021**, *35*, 116–131. [CrossRef]
37. Christensen, H.S. A conjoint experiment of how design features affect evaluations of participatory platforms. *Gov. Inf. Q.* **2021**, *38*, 101538. [CrossRef]
38. Hernando-Malipot, M. DepEd: Most Students' Prefer 'Modular' Learning over Online. Manila Bulletin. 3 July 2020. Available online: https://mb.com.ph/2020/07/03/deped-most-students-prefer-modular-learning-over-online/ (accessed on 13 March 2021).
39. Butler, A.C. Multiple-Choice Testing in Education: Are the Best Practices for Assessment Also Good for Learning? *J. Appl. Res. Mem. Cogn.* **2018**, *7*, 323–331. [CrossRef]
40. Treser, M. *Matching Test Items: Getting Them Right*; ELearning Industry: Reno, NV, USA, 2015.
41. Jung, E.; Kim, D.; Yoon, M.; Park, S.; Oakley, B. The influence of instructional design on learner control, sense of achievement, and perceived effectiveness in a supersize MOOC course. *Comput. Educ.* **2019**, *128*, 377–388. [CrossRef]
42. Chandna, R.; Saini, S.; Kumar, S. Fuzzy AHP based performance evaluation of massive online courses provider for online learner. *Mater. Today Proc.* **2021**, in press. [CrossRef]

43. Kirschner, F.; Paas, F.; Kirschner, P.A. Individual and group-based learning from complex cognitive tasks: Effects on retention and transfer efficiency. *Comput. Hum. Behav.* **2009**, *25*, 306–314. [CrossRef]
44. Schultze, T.; Mojzisch, A.; Schulz-Hardt, S. Why groups perform better than individuals at quantitative judgment tasks: Group-to-individual transfer as an alternative to differential weighting. *Organ. Behav. Hum. Decis. Process.* **2012**, *118*, 24–36. [CrossRef]
45. Dobao, A.F. Collaborative writing tasks in the L2 classroom: Comparing group, pair, and individual work. *J. Second Lang. Writ.* **2012**, *21*, 40–58. [CrossRef]
46. Suliman, W.; Abu-Moghli, F.; Khalaf, I.; Zumot, A.; Nabolsi, M. Experiences of nursing students under the unprecedented abrupt online learning format forced by the national curfew due to COVID-19: A qualitative research study. *Nurse Educ. Today* **2021**, *100*, 104829. [CrossRef]
47. Audet, E.; Levin, S.; Metin, E.; Koestner, S.; Baracan, S. Zooming their way through university: Which Big 5 traits facilitated students' adjustment to online courses during the COVID-19 pandemic. *Personal. Individ. Differ.* **2021**, *180*, 110969. [CrossRef]
48. Hart, T.; Bird, D.; Farmer, R. Using blackboard collaborate, a digital web conference tool, to support nursing students placement learning: A pilot study exploring its impact. *Nurse Educ. Pract.* **2019**, *38*, 72–78. [CrossRef]
49. Pal, D.; Vanijja, V. Perceived usability evaluation of Microsoft Teams as an online learning platform during COVID-19 using system usability scale and technology acceptance model in India. *Child. Youth Serv. Rev.* **2020**, *119*, 105535. [CrossRef]
50. Albay, E.M.; Eisma, D.V. Social SciencesHumanities Open Performance task assessment supported by the design thinking process: Results from a true experimental research. *Soc. Sci. Humanit. Open* **2021**, *3*, 100116. [CrossRef]
51. Daugherty, K.K.; Ceballos-Coronel, M.L.; Soja, W. Sensitivity and specificity of course grades after exam failure used as an indicator for final course performance. *Curr. Pharm. Teach. Learn.* **2015**, *7*, 163–168. [CrossRef]
52. Palvia, S.; Aeron, P.; Gupta, P.; Mahapatra, D.; Parida, R.; Rosner, R.; Sindhi, S. Online Education: Worldwide Status, Challenges, Trends, and Implications. *J. Glob. Inf. Technol. Manag.* **2018**, *21*, 233–241. [CrossRef]
53. Dejene, W.; Chen, D. The practice of modularized curriculum in higher education institution: Active learning and continuous assessment in focus. *Cogent Educ.* **2019**, *6*, 1–16. [CrossRef]
54. Van Braak, M.; van de Pol, J.; Poorthuis, A.M.G.; Mainhard, R. A micro-perspective on students' behavioral engagement in the context of teachers' instructional support during seatwork: Sources of variability and the role of teacher adaptive support. *Contemp. Educ. Psychol.* **2020**, *64*, 101928. [CrossRef]
55. Ruzek, E.A.; Schenke, K. The tenuous link between classroom perceptions and motivation: A within-person longitudinal study. *J. Educ. Psychol.* **2019**, *111*, 903–917. [CrossRef]
56. Watters, A. The Problems with Peer Grading in Coursera. Inside Higher ED, 2012. Available online: https://www.insidehighered.com/blogs/hack-higher-education/problems-peer-grading-coursera (accessed on 3 July 2021).
57. Carney, C.; McNeish, S.; McColl, J. The impact of part time employment on students' health and academic performance: A Scottish perspective. *J. Furth. High. Educ.* **2006**, *29*, 307–319. [CrossRef]
58. Nonis, S.A.; Hudson, G.I. Academic Performance of College Students: Influence of Time Spent Studying and Working. *J. Educ. Bus.* **2010**, *81*, 151–159. [CrossRef]
59. Mohammadi, H. Investigating users' perspectives on e-learning: An integration of TAM and IS success model. *Comput. Hum. Behav.* **2015**, *45*, 359–374. [CrossRef]
60. Cidral, W.A.; Oliveira, T.; Di Felice, M.; Aparicio, M. E-learning success determinants: Brazilian empirical study. *Comput. Educ.* **2018**, *122*, 273–290. [CrossRef]
61. Hornbæk, K.; Hertzum, M. Technology Acceptance and User Experience: A Review of the Experiential Component in HCI. *ACM Trans. Comput.-Hum. Interact.* **2017**, *24*, 1–30. [CrossRef]
62. Prasetyo, Y.T.; Tumanan, S.A.R.; Yarte, L.A.F.; Ogoy, M.C.C.; Ong, A.K.S. Blackboard E-learning System Acceptance and Satisfaction Among Filipino High School Students: An Extended Technology Acceptance Model (TAM) Approach. In Proceedings of the 2020 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Singapore, 14–17 December 2020; pp. 1271–1275. [CrossRef]
63. Shaw, T.J.; Yang, S.; Nash, T.R.; Pigg, R.M.; Grim, J.M. Knowing is half the battle: Assessments of both student perception and performance are necessary to successfully evaluate curricular transformation. *PLoS ONE* **2019**, *14*, e0210030. [CrossRef]
64. Kuhn, K.L.; Rundle-Thiele, S.R. Curriculum Alignment: Exploring Student Perception of Learning Achievement Measures. *Int. J. Teach. Learn. High. Educ.* **2009**, *21*, 351–361. Available online: https://files.eric.ed.gov/fulltext/EJ909068.pdf (accessed on 4 July 2021).
65. Zhu, M.; Liu, O.L.; Lee, H.S. The effect of automated feedback on revision behavior and learning gains in formative assessment of scientific argument writing. *Comput. Educ.* **2020**, *143*, 103668. [CrossRef]
66. Shah, S.; Cox, A.G.; Zdanowicz, M.M. Student perceptions of the use of pre-recorded lecture modules and class exercises in a molecular biology course. *Curr. Pharm. Teach. Learn.* **2013**, *5*, 651–658. [CrossRef]
67. Domingo, K. PH internet speed nearly tripled in 2020, but lags behind other Asian countries: NTC. *ABS-CBN News*, 7 December 2020.
68. Julia, K.; Peter, V.R.; Marco, K. Educational scalability in MOOCs: Analysing instructional design to find best practices. *Comput. Educ.* **2021**, *161*, 104054. [CrossRef]
69. Asli, M.F.; Hamzah, M.; Ibrahim, A.A.A.; Ayub, E. Problem characterization for visual analytics in MOOC learner's support monitoring: A case of Malaysian MOOC. *Heliyon* **2020**, *6*, e05733. [CrossRef]

70. Kim, D.; Jung, E.; Yoon, M.; Chang, Y.; Park, S.; Kim, D.; Demir, F. Exploring the structural relationships between course design factors, learner commitment, self-directed learning, and intentions for further learning in a self-paced MOOC. *Comput. Educ.* **2021**, *166*, 104171. [CrossRef]
71. Prasetyo, Y.T. Standardizing Human Factors and Ergonomics Education for the Undergraduate Programs in Industrial Engineering: A Comparative Analysis between Indonesia, Philippines, and Taiwan. In Proceedings of the 2020 IEEE 7th International Conference on Industrial Engineering and Applications (ICIEA), Bangkok, Thailand, 16–21 April 2020.
72. Prasetyo, Y.T.; Roque, R.A.; Chuenyindee, T.; Young, M.N.; Diaz, J.F.; Persada, S.F.; Miraja, B.A.; Perwira Redi, A.A. Determining Factors Affecting the Acceptance of Medical Education eLearning Platforms during the COVID-19 Pandemic in the Philippines: UTAUT2 Approach. *Healthcare* **2021**, *9*, 780. [CrossRef]
73. Lahenius, K.I.; Martinsuo, M.M. Students' experiences of supervision in doctoral education in Industrial Engineering and Management. In Proceedings of the 2009 IEEE International Conference on Industrial Engineering and Engineering Management, Hong Kong, China, 8–11 December 2009.