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Determining The Values and Attributes of e-Learning From Vocational Students' Perspectives

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Value co-creation is created with the users when they consume or use the product or services. Value co-creation is exclusive among individuals but can influence the user's behaviour in using a product or service and in the users' cognitive space. E-learning as a service platform should deliver value that fulfils users' needs. Thus, it is essential to identify users' critical features such as forums, videos, and rewards (referring to frequently or most used attributes) on the e-learning platform from the users' view and not the developer's perspective. Students as the primary users of e-learning are essential in creating and extracting users' co-creation values. This paper aims to identify the critical attributes and values from vocational students' perspectives using the means-end chain (MEC) methodology. The relationship among these elements would build a ladder and lead to the purpose of the research. Data were gathered from 151 vocational students using the MEC model and hard laddering – Association pattern technique (APT) technique and developed the summary implication matrix (SIM) and hierarchical value map (HVM). The results showed that students consider eight valuable values, with five dominant values: sense of accomplishment, helpful, self-fulfilment, excitement, and fun and enjoyment of life. Attributes such as games and quizzes, videos, chat forums, rewards, widgets, and apps contribute to co-creation values. Besides, vocational students tend to prefer simulation exercises and live streaming features. The significance of this study is to help identify the co-creation value based on critical elements on an e-learning platform. Building an e-learning platform based on the user's point of view is getting the users to use the system. Further, valuable insight into values may provide input for the design of the e-learning model from the perspective of value.

Keywords: co-creation value; means-end chain; e-learning; student; vocational

I. INTRODUCTION

Online education is essential as the education system changes with time and an ever-changing technology environment, and every educational institute must use one to facilitate teaching and learning (Logan, Johnson & Worsham, 2021). If previously, e-learning usage was not as projected, now e-learning currently plays an essential role in supporting and engaging education and learning among its users. It is necessary significant when teachers and students are restricted from going to learning institutes during the pandemic. Although students and teachers initially prefer face-to-face learning, they must find alternatives to ensure continuous teaching and learning. Besides, teachers and students need to adapt to changes to survive in the ever-changing technology environment. Over the years, e-learning services and computer-based educational systems have been actively researched, developed, and applied to enrich and improve teaching and learning. Most system developers focus on tangible (e.g., devices, infrastructures) resources to build e-learning platforms, while intangible resources such as values to users and institutions are less considered (Motamarri, 2017). Values co-creation are unique among individuals but can influence the user's behaviour in using a product or service and exist in the users' cognitive space. The cognitive structure towards a product or service can contribute to information acquisition and strengthening

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understanding of the environment involved (Tey *et al.*, 2017). E-learning platforms should offer assistance to deliver value (Rubio, Villaseñor & Yague, 2019) that fulfils users' needs. Therefore, it is essential to identify platforms' critical features (frequently or most used attributes) on the e-learning platform from the users' perspectives.

Service science teaches how to design, build, operate, use, sustain, and dispose of service systems to benefit customers, providers, and society, focusing on value co-creation (VCC). In contrast, service science offers a new perspective based on S-D Logic (Vargo & Lusch, 2016). VCC is key to generating value by integrating their value with others and developing a new one (Zhang *et al.*, 2019). User involvement in system development may accomplish a successful system, and with VCC, all users are part of the creators of value when using the system (Ahmad, Mukhtar & Yahya, 2018). To convert the traditional teacher-student models, in which teachers determine the learning resources, they can participate in VCC's educational processes into a flexible structure and an active learning environment.

This study focused on e-learning services at vocational schools to identify critical functional attributes of a successful e-learning platform by understanding the cognitive structure toward system usage and their values derived from the students' perspective. Vocational institutes need to support the aim of the education ministry in developing skilled talent to meet the demands of the growing industry and promote unique opportunities for career development (Nurhafizah Abdul Musid *et al.*, 2019). A study by (Thangaiah, Jenal & Yahaya, 2020) stated fewer studies were conducted to identify the factors that cause the lack of e-learning in the vocational institute. Vocational institutes need to align with the current technology era, especially in modelling digital learning to strengthen graduates' technical skills so that they cannot be left behind and provide a quality workforce. One way is by instilling digital usage while studying.

This paper applies the Means-End Chain (MEC) to identify the value that leads users to use e-learning attributes. Pandemic proved that online learning is essential; thus, e-learning development is explored more from the students' value point of view. E-learning with personal values will allow system developers to more effectively design the platform and encourage more usage or long-term usage from the students.

The remainder of the paper is structured as follows: Section II, "Literature Review," outlines the topics on e-learning, value co-creation, and MEC and APT. Section III, "Methodology," describes how the data was collected. Next, Section IV, "Data Analysis," draws how the laddering data is analysed, and Section V, "Discussion," discusses the analysed ladders. Lastly, Section VI, "Conclusion," summarises as a whole.

II. LITERATURE REVIEW

A. E-learning

E-learning is the delivery of learning material by utilising information and communication via computer or telecommunications media such as the internet and digital media to enable learning and teaching (Ghavifekr & Mahmood, 2015; Muktiarni *et al.*, 2020). It can take many platforms, from massive open online courses (MOOCs), virtual learning environments (VLE), learning management systems (LMS), and many others (Hussain *et al.*, 2018).

With technology enhancement, collaborative and virtual learning environments have provided a dynamic platform of interaction and collaboration for students and teachers. A successful e-learning system should provide a platform that enables qualitative two-way communication between students and teachers and amongst students themselves. Previous e-learning providers were too focused on developing interactive content and user-friendly systems but failed led to study their user needs and expectations and the factors contributing to their engagement in online learning (Bakar, Wook & Ashaari, 2015). Therefore, through its vocational colleges as one of the premier higher education TVET providers, one of its objectives is to advocate skilled talent to the growing and changing demands of industry and promote unique opportunities for career development (Ministry of Education, 2016).

B. Value co-creation

Service science is a multidisciplinary effort to understand how service systems interact and create shared value (Spohrer *et. al.*, 2008; Vargo & Lusch, 2008). Cooperation between service providers and consumers can produce value where value exists only due to teamwork and collaboration from the parties involved only. VCC meets users' needs and exists while a product or service is being used.

Values are the standards or criteria of a person's conduct that guide and drive consumers' decision-making (Bhuasiri *et. al.*, 2012; Lee *et al.*, 2014). Values exist in every individual and can influence human attitudes and determine a person's choices. Without the element of user experience, the evaluation of an item depends on technical aspects or external variables (Mohamed Nazul Ismail, Yahya & Mukhtar, 2013). The concept of VCC is used to create an interaction between the provider (teacher) and the users (students) to enable the events to be handled together and create new value (Elias *et al.*, 2021).

In terms of learning, Uribe-Rios *et al.* (2018) stated that students could be motivated through real experiences, dialogues with experts, and discussions during the co-creation process. Students can feel value through co-creation, particularly when their opinions are valued. Further, a study by (Thangaiah, Jenal & Yahaya, 2020) identified the need for co-creation in the e-learning environment or vocational institute.

Several classification systems have been proposed and applied to express users' values, such as the Rokeach Value System, List of Values (LOV), Schwartz's classification system, and values and lifestyles (VALS). Studies focused on online behaviour and have been used to study internet-related user values applied LOV (Lin & Wang, 2008; Cheng, Hsu & Liu, 2018). Therefore, LOV would be suitable to identify the e-learning value of vocational students. Besides that, the researcher added specific values such as responsible, self-discipline, help, power, and culture from the Schwartz classification system to enrich the value list.

B. MEC and APT Theory

MEC theory is a popular theory to identify the innermost thinking toward a product/service in terms of consumer cognitive structure (Lin, Fu & Chen, 2019). Scholars have used MEC theory to understand how people perceive value (Phillips & Reynolds, 2009) by choosing a product or service based on attributes. Platform attributes(A) are means, via consequences (C) upon product/service usage, to reach users' anticipated ends, referring to values (V). Attribute helps the user to fulfil the valued desire through consequences/benefits. Attributes refer to concrete features such as physical/technical or abstract features (Bieberstein & Roosen, 2015). Examples of concrete features such as question bank and animated content and example of abstract features are quality and safety. Consequences can be categorised into functional consequences (FC) and psychological consequences (PC). FC refers to concrete benefits of service usage, and PC refers to subjectivity such as feelings. Values are closely associated with attitudes, personality, and needs but are conceptually different (Park, Yap & Makkar, 2019). Thus, by MEC, every product/service leads to consequences and values. We integrate MEC and co-creation to explore the critical values provided by the e-learning platform from the students' perspective.

The links between these constructs would provide information on what and why an attribute means to the users. According to (Gutman, 1982), laddering is the most commonly used technique in MEC theory, and there are two: soft laddering and hard laddering. Soft laddering is a qualitative technique that applies individual, face-to-face, semi-structured interviews to reveal values. Hard laddering is a quantitative technique that relies on a questionnaire and larger samples between the two. More researchers used soft laddering between both and hard laddering (Borgardt, 2020). Still, soft laddering is projected as time-consuming to collect and analyse data, expensive, and requires experienced interviewers (Ronda, Valor & Abril, 2020).

This study collected data from vocational students using one of the hard laddering techniques known as the Association pattern technique (APT) method outlined by (Reynolds & Gutman, 1988; Ter Hofstede *et al.*, 1998). APT has been widely used in marketing research (Diedericks, Erasmus & Donoghue, 2020). Thus, the APT was used for data collection and presented in matrix form called summary implication matrix (SIM). Table 1 shows the constructs and elements collected from literature papers and pilot studies.

Table 1. MEC items

Construct	Code	Element	Code	Element	Code	Element
Attribute	A1	Chat forums	A10	Announcement	A19	Simulation exercise
	A2	Design & layout	A11	Games and quiz	A20	Sharing repository
	A3	Widget & apps	A12	Bilingual	A21	Personalised interface
	A4	Student's portfolio	A13	Colour and graphic	A22	Expert support
	A5	Animated content	A14	Live to learn	A23	Evaluation
	A6	Rewards	A15	System quality	A24	Question bank
	A7	Help & Support	A16	Information quality	A25	Course Management
	A8	Video	A17	Service quality		
	A9	Digitalised Library	A18	Data Safety		
Functional consequences	FC1	Ease communication	FC6	Ensures learning equality	FC11	It gives popularity and prestige
	FC2	Encourage sharing	FC7	Facilitate access to information	FC12	Increase competitiveness
	FC3	Simplify the task	FC8	Easy referencing	FC13	Gain new skills
	FC4	Ease learning	FC9	Control learning	FC14	Increase productivity
	FC5	Fortify knowledge comprehension	FC10	Learn at own pace	FC15	Learn new technology
Psychological consequences	PC1	Feel proud	PC6	Carrying out duties	PC11	Elevate the level of thinking
	PC2	Positive thinking style	PC7	Involved in learning	PC12	Get new perception
	PC3	Enjoyed using platform	PC8	Learn to share ideas	PC13	Feel respected and appreciated
	PC4	Attracted to try new technology	PC9	Motivated to learn	PC14	Feel comfortable
	PC5	Highlight experience and knowledge	PC10	Grateful for the opportunity	PC15	Gain new experience
Values	V1	Excitement	V7	A warm relationship with others	V12	Helpful
	V2	Fun and enjoyment of life	V8	Security	V13	Power
	V3	Sense of belonging	V9	Self-fulfilment	V14	Culture
	V4	Self-respect	V10	Responsible	V15	Practical
	V5	Sense of accomplishment	V11	Self-discipline	V16	Quality lifestyle
	V6	Being well respected				

III. METHODOLOGY

Integrating the MEC and values, this study explores how respondents' perceptions of e-learning are formed according to their experience. An online data collection using the APT technique was used to administer the laddering task. Snowball sampling was used to identify students with e-learning platform experience by their teachers from four regions in Malaysia: north, middle, south, and east. Students were briefed on the research aim and procedures using social media like Whatsapp and Telegram. Once an agreement was reached, the respondent was given the link to Google Form to collect their demographic information. Next, based on the email contained in Google Form, each respondent was given

the link to the laddering tool of Google Sheets. Respondents completed the laddering by clicking on the check box provided according to its instructions. Respondents were given a list of constructs, the items of MEC as in Table 1. Students were instructed to first click three essential attributes to them and next click the following sheets to determine why each attribute is critical. Next, they clicked on three psychological consequences for the attributes and the value. Upon completion of the first ladder, the process was repeated for the second and third attributes. The laddering tools were equipped with definitions for each element. Besides, respondents were given manuals of the laddering process and could even reach the researcher if they needed additional help. The last sheet presented a summary of completed ladders. In total, one respondent can build 27 ladders. The Google Sheets tab is viewable; thus, the respondent could view the number of sheets to answer and anticipate how long the process goes on rather than giving them the ambiguity. The study was conducted from November to December 2020 with 201 respondents. Hundred and fifty-one (151) surveys were accepted after the pre-processing process. The details of the respondents are summarised in Table 2.

Table 2. Demographic profile of respondents (n = 151)

Characteristics	n	Percentages (%)
Gender		
Male	69	45.7
Female	82	54.3
Age		
16-17	53	35.1
18-19	98	64.9
Region		
North	38	25.2
Middle	40	26.5
South	40	26.5
East	33	21.9
Frequency of e-learning usage (weekly)		
None	0	0.0
Once	0	0.0
2-3	2	1.9
4-6	37	35.6
Daily	65	62.5

It was observed that more female students participated than male students. More students under 18-19 years old (64.9%) participated in the age category. Meanwhile, respondents from each region within 30-40 students each. It shows respondents were collected equally and not overpowered by one. In terms of frequency of e-learning usage (weekly), daily (62.5%) is the highest compared to other options. Besides for none and once option, there were no data recorded. This is perhaps, and data was collected during the pandemic when the vocational college and other institutes implemented online learning. Students are required to attend classes online, according to time table.

IV. DATA ANALYSIS

Data analysis discusses the quantitative APT analysis results from the data collection procedure. The laddering format consists of attribute (A) → functional consequences (FC) → psychological consequences (PC) → values (V) supports the e-learning platform requirement attribute. In the SIM, the matrix form constructs include three implication matrices for A→FC, FC→PC, and PC→V. A matrix form of A→FC→PC→V associations (also termed implication matrix) reveals the dominant links in a hierarchical value matrix (HVM). A SIM displays the frequency of each construct category leading to another in the same row. LadderUX, a computer-assisted software (Gandia *et. al.*, 2018; Borgardt, 2020; Sankaran & Chakraborty, 2021), and Microsoft Excel analysed data. Three indexes were used to determine which ladder would be finalised: cut-off value, abstraction, and centrality. Both software can calculate the three indexes, and both produce the same and thus validates the output.

First, the cut-off index was used to determine the ladder's stability for the ladder under the cut-off index to be eliminated, thereby making the HVM more representative (Lin & Lin, 2014). The top-down technique was used to determine the cut-off value and identify the ladder in which PC→V exceeds the determining cut-off value. Next, the path from the attribute that produces the ladder is specified. According to (Gengler & Reynolds, 1995; Lin & Tu, 2012), a cut-off index value is 5% of the total respondent. Thus, 5% of 151 respondents would be 8. Therefore, a cut-off value of 8 was chosen to decide the vital relationship in this study.

The cut-off index determination is essential as if the value is too small, most ladders would be accepted elsewhere and complicate the analysis. Where else, if the cut-off is too big, some necessary ladders would be missed. The SIM was analysed to find the ladders that pass the cut-off index. Three matrix implementation tables between the constructs were analysed: attribute and functional consequences, functional consequences and psychological consequences, and psychological consequences with values. A matrix table of 27 x 27 is produced.

The second index is abstractness to identify each element's hierarchical position (attribute, consequences, or value) in the HVM by computing the ratio of in-degrees over the sum of in-degrees and out-degrees (Tey *et al.*, 2017). Elements with high abstractness values are classified as ends, while elements with low abstractness scores are means (Xiao, Guo, & D'Ambra, 2017). With hard laddering, all attributes produce an abstraction value of 0 since all attributes have no in-degrees value ratio. Whereas, for all the functional consequences elements, the values are 0.333. The psychological consequences are 0.667 and for values are 1. As the abstractness value for the attribute construct is 0, all the attribute elements are placed at the bottom of the HVM diagram, followed by functional consequences, psychological consequences, and value elements on the top. Thus, it proved the relationship explained before as A→FC→PC→V. Besides that, hard laddering only has a direct connection compared to soft laddering, which has a direct and indirect relationship that enables a more straightforward analysis for hard laddering than soft laddering.

Next, the third index in designing HVM is the centrality value between 0-and 1. Centrality is used to determine the importance of each element in HVM by calculating the ratio of the sum of the construct's column and row totals in the SIM over the sum of all cell entries in the SIM (Kaciak, E, Cullen, C & Sagan, 2015). A higher centrality value means the particular element is involved more frequently or dominant in the linkages with other elements, either as a source or destination (Pieters, Baumgartner & Allen, 1995). As a result, 19 ladders are chosen, compromising twelve (12) attributes, eight (8) functional consequences, eight (8) psychological consequences, and eight (8) values. The primary path among the ladders with code and cut-off values is presented in Table 3.

Table 3. MEC elements and cut-off value

A code	cut-off	FC code	cut-off	PC code	cut-off	Value	cut-off
A11	603	FC4	51	PC3	11	V1	10
A11	603	FC12	120	PC2	17	V16	9
A12	192	FC4	42	PC10	10	V3	9
A19	201	FC13	52	PC4	11	V16	9
A1	270	FC1	81	PC2	15	V1	8
A1	270	FC1	81	PC8	15	V7	8
A2	207	FC14	42	PC14	9	V9	8
A3	198	FC2	30	PC4	9	V5	8
A5	207	FC4	47	PC3	14	V2	8
A6	315	FC5	42	PC7	8	V5	8
A6	315	FC12	45	PC7	9	V5	8
A7	225	FC4	48	PC3	9	V12	8
A8	513	FC4	93	PC3	19	V2	8
A8	513	FC4	93	PC9	12	V12	8
A11	603	FC5	87	PC3	12	V2	8
A11	603	FC12	120	PC9	16	V5	8
A13	207	FC7	48	PC14	10	V3	8
A14	207	FC1	39	PC3	11	V16	8
A19	201	FC5	33	PC4	10	V5	8

Table 4 shows the centrality and abstractness index values for the chosen (19) ladder elements.

Table 4. Centrality and abstractness index value

Contruct	Elements	Centrality	Abstractness
Attribute	A1	0.011	0.00
	A2	0.009	0.00
	A3	0.008	0.00
	A5	0.009	0.00
	A6	0.013	0.00
	A7	0.009	0.00
	A8	0.021	0.00
	A11	0.025	0.00
	A12	0.008	0.00
	A13	0.009	0.00
	A14	0.009	0.00
	A19	0.008	0.00

Functional consequences	FC1	0.043	0.33
	FC2	0.022	0.33
	FC4	0.044	0.33
	FC5	0.037	0.33
	FC7	0.026	0.33
	FC12	0.022	0.33
	FC13	0.016	0.33
	FC14	0.025	0.33
Psychological consequences	PC2	0.029	0.67
	PC3	0.036	0.67
	PC4	0.025	0.67
	PC7	0.023	0.67
	PC8	0.025	0.67
	PC9	0.027	0.67
	PC10	0.017	0.67
	PC14	0.022	0.67
Values	V1	0.016	1.00
	V2	0.015	1.00
	V3	0.010	1.00
	V5	0.018	1.00
	V7	0.010	1.00
	V9	0.016	1.00
	V12	0.017	1.00
	V16	0.014	1.00

All three index values are used to develop the HVM diagram, as shown in Figure 1. The lines connecting each element show the relationship, and the thickness indicates the strength of the relationship. The thicker the lines means more relationship was built.

V. RESULT AND DISCUSSION

The MEC theory with SIM and HVM allows us to understand better how students attain the respective values in using e-learning. The result and discussion sections focus on those who pass the cut-off index values and create a higher centrality index.

The results show that the most common attributes that students looked for were “games and quiz” and “video.” The “games and quiz” produced the most ladders and formed four ladders above the cut-off index. Meanwhile, “video”, “chat forums”, “rewards,” and “simulation exercise” have two dominant ladders each.

Elements with thicker borders in Figure 1 have a centrality value of 0.025 and more. Games and quiz are the only attributes with a 0.0.25 value among the twelve attributes. Meanwhile, five (5) FC with higher centrality values is “ease learning”, “ease communication”, “fortify knowledge comprehension”, “increase productivity”, and “facilitate access to information.” Next, five (5) dominant PC elements are “enjoy using platform”, “positive thinking style”, “motivated to learn”, “attracted to try new technology”, and “learn to share ideas”. Lastly, even though none of the elements of the value has 0.025 and above centrality values, all the eight (8) values in the HVM had values above 0.010 among sixteen values in the laddering list. “Sense of accomplishment” and “helpful”, “excitement”, and “fun and enjoyment of life” are among the top values that make students attracted to the e-learning attributes.

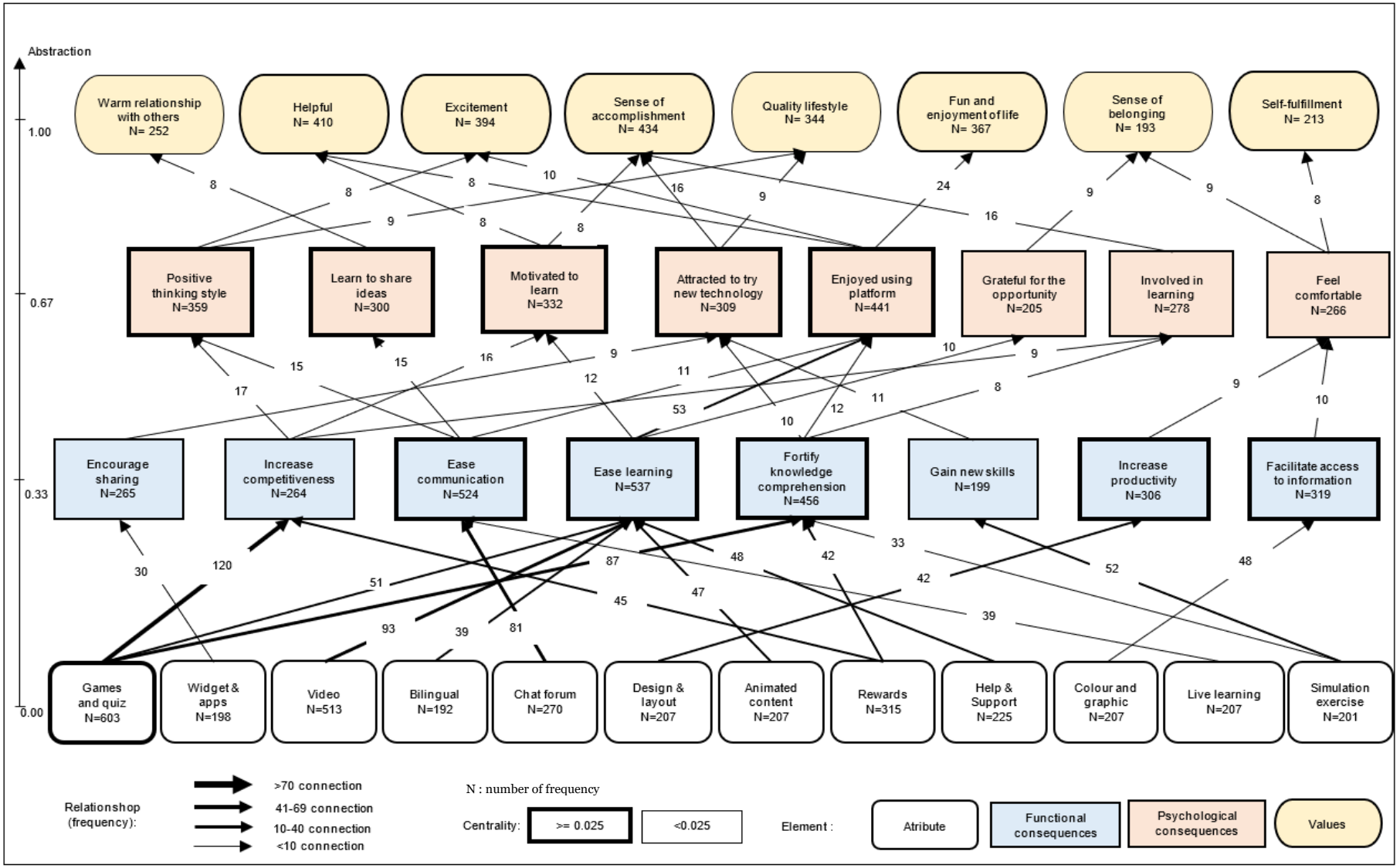

Figure 1. Hierarchical value map

Games and quizzes with video were two attributes that generated the most clicks among the students, with 603 and 513, respectively. Games and quiz attribute leads to “ease learning”, “increase competition”, and “fortify knowledge comprehension”. In the comment section, students mentioned educational games tools such as Kahoot! and Quizzes help them most in learning sessions. “Games and quizzes” were chosen because of the value of "excitement," "quality lifestyle," "sense of accomplishment," and "fun and enjoyment of life." This attribute is closely related to the "reward" attribute. Both the ladders for “rewards” lead to a "sense of accomplishment." Even though “rewards” can be intrinsic or extrinsic motivation, it makes students fortify knowledge comprehension, increase competitiveness, and eventually be involved in learning. Digital game-based learning, such as on e-learning platforms, brings a sense of achievement to students, thus helping them improve their learning outcomes and encourage them to think (Lin & Lin, 2014; Krouska, Troussas & Virvou, 2018).

Videos are beneficial in vocational learning as they explain the physics concepts with text, equations, diagrams, and animations and demonstrate real-world applications. Students linked video to central values: "fun and enjoyment of life" and "helpful". Video features can help students learn through visuals and help enrich their understanding. Besides, the vocational syllabus evolves more on technology and hands-on material. Anyway, videos today are mainly one way, and their viewing is passive; thus, including interactive features and confined to in-video quizzes would attract students more (Kleftodimos & Evangelidis, 2018). Nonetheless, since the pandemic, many educators started building their youtube channels and sharing videos.

The chat forums attribute formed ladders compromising: chat forums → ease communication → positive thinking style → excitement value and chat forums → accessible communication → learn to share ideas → warm relationship with others value. Students are looking forward to the excitement and building relationship with others on forums. Interaction platforms were able to provide engagement for users (Ramaswamy & Ozcan, 2018). As vocational colleges are in every state in Malaysia, a good platform that gathers everyone would be rewarding for the institute and its people.

Meanwhile, another dominant ladder forms: widgets and apps → encourage sharing → attract to try new technology → sense of accomplishment value. Widget and apps are the features in e-learning that attracts users and assist their users (Chew, Rahim & Vighnarajah, 2017). During the pandemic, teachers attract students with various widgets and apps to provide fun learning. Anyway, too many graphical widgets and options might drive away the users (Harrati *et al.*, 2016).

The rest of the chosen attributes are helpful for students in learning: simulation and live learning that leads to a quality lifestyle. Simulation exercise also leads to a sense of accomplishment value. With the pandemic issue, face-to-face learning and teaching are impossible, leading everyone towards online learning. It opens a way for everyone to try new technology and adapt to new ways of learning by having a better quality of life and improving life quality (Xiao, Guo, & D'Ambra, 2017). Simulation training online can help students to practice before they handle real machines. Besides, nowadays, simulation exercises help teachers set up assessment questions and marking. Some of the students from networking courses mentioned that Cisco software helps them test their knowledge and prepare them for the final practical assessment. While, live learning is driven by a desire for social interaction and community spirit as well as describing social relationships as the main motivating force for engagement from engaged users (Hilvert-Bruce *et al.*, 2018). Users can view other participants online and reach them and engage in the learning experience.

Design and layout, animated content, help, and support are three attributes that form other dominant ladders. Design and layout lead to self-fulfilment value. A well-designed online discussion among students can increase engagement and interaction (Zheng & Warschauer, 2015). Self-fulfilment makes one feel like one's potential is actualised, conceptualised as high self-esteem and accomplishing goals (Huang & Chen, 2018). While “animated content” is motivated by “fun and enjoyment of life” and “help and support” by helpful value.

The findings also found that the students look forward to being "bilingual" in the learning platform. Since data was collected in Malaysia, students prefer the Malay language to English. If we use an already developed platform and adopt it into the institute, the medium will be English. Students

mentioned that being bilingual leads to a sense of belonging. It is a value where a person feels they belong and are accepted (Wallace & Yu, 2009; Huang & Chen, 2018). Besides, "colour and graphic" also gives students a sense of belonging value. Colour is an important interface design element because it provides a visual representation of interactions (Saidin *et al.*, 2017) and is considered an important component in design (Maizatul Aminah Ibrahim, Ashaari & Wook, 2013). This attribute needs to be emphasised on the learning platform. Hence, students feel they belong and leading them to voluntarily use it and perform tasks for the institute's reputation, patriotism, and loyalty.

VI. CONCLUSION

The findings obtained through the MEC investigation help find VCC in the vocational students using e-learning platforms in Malaysia. Vocational schools' learning is more towards practical learning and teaching, which cooperates with hands-on assessments. The APT technique has been applied to identify the values that drive students to specific attributes that benefit them while using e-learning. Sense of accomplishment, helpful, self-fulfilment, excitement and fun, and enjoyment of life are the most sought value among students in e-learning. The attributes that benefit students are games and quizzes, videos, rewards, and forums. Further, attributes such as the simulation exercise and live learning are unique compared to regular schools, which help to attract vocational students and institutes.

Kovanovića *et al.* (2019) mention that most students do not use the available tools for e-learning appropriately, indicating a lack of metacognitive capacity, skills, and motivation to use the provided technology effectively. Further, identification of VCC can guide stakeholders to focus on improving critical features of an attribute instead. The VCC element can influence the behaviour of users to continue using the e-learning platform. This paper successfully identified the values in e-learning for students and what attributes are essential to them. Therefore, when software developers design e-learning platforms and services, they can emphasise physiological functions and apply them. If system developers concentrate more on the e-learning attributes based on technology and trend, now it is equally vital to understand the values that lead the users to use the platform.

Future studies may explore particular attributes such as games and quizzes with videos with more specific features to lead the users. Hence, we recommend analysing more detailed attributes' features for the laddering items. The study has some limitations. First, because our participants relied on the given list by the researcher, thus there are chances some important items are missed. Besides, since the laddering technique is different from the commonly used questionnaire, the researcher must be available or present to collect quality data during the data collection process.

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