The use of Virtual Learning Environment for Students' Effective Engagement in the Higher Education Institutions Through Knowledge Management and Blended Learning

Nasrullah Khan Khilji
School of Computing and Engineering, University of West London, London, UK
Nasrullah.Khilji@uwl.ac.uk

Abstract: The purpose of this paper is to examine the continuously growing use of Virtual Learning Environment (VLE) for students' effective engagement in Higher Education Institutions (HEIs) through knowledge management (KM) and blended learning (BL). Digital technology has transformed teaching and learning in such a way that VLE became indispensable part of HEIs to effectively engage students through blended learning. COVID-19 pandemic has severely affected organisations worldwide including the HEIs as institutions were compelled to close their campuses in response to lockdowns. The HEIs have responded with greater agility to transform campus teaching into virtual learning. VLE is relentlessly evolving in terms of scope and application while HEIs are renovating themselves in parallel ensuring a practical online platform for digital revolution. In this study, the identified research gap is determined to assess the level of students' engagement in their higher education through KM and blended learning specifically using virtual learning activities. A cross-sectional quantitative methodological approach is employed to assess the use of VLE on students' engagement through KM and blended learning. The students' effective engagement is assessed by employing the research arithmetical analysis method based on five demographic factors including their "age, gender, field of study, ethnicity, and mode of study programme". The collected data is systematically analysed to validate students' cognitive, emotional, and behavioural engagement through KM and blended learning practices. The effective students' engagement through KM and blended learning questionnaire 'KMSEBL'© is industrialized, comprising of five essential demographic factors "age, gender, ethnicity, field of study, and mode of study", containing 12 close-ended substances under three main dimensions to assess students' effective engagement including 'students' cognitive, emotional, and behavioural factors. The data outcome is later evaluated applying the Differential Item Functioning (DIF) analysis, which indicates that students' various groups and sub-groups responding in a different manner in context of elevated substances. The research result approves the role of technology innovation for enhanced students' engagement in higher education through KM and blended learning practices. However, the future research will investigate what specific KM and blended learning activities are essential in engaging students from diverse demographic, geographic, psychographic groups.

Keywords: Virtual Learning Environment, Higher Education Institutions, Knowledge Management, Blended Learning, Students' Engagement

1. Introduction

Technological advancement in education system is ultimately referred to virtual learning environment (VLE), which is increasingly becoming essential component of HEIs (Govindarajan and Srivastava, 2020). The HEIs, as a teaching provision, proposes various courses to prepare students for their careers to add value to the society. This means students, knowledge and technology play crucial roles in achieving education provision in the HEIs (Abass et al., 2021). Knowledge sharing through blended learning is a cause of knowledge management (KM), which is a fundamental element in HEIs that requires an appropriate use of VLEs to circulate knowledge from teaching and research through e-learning (Hargitai et al., 2021). However, the VLE major challenge is how to engage students effectively through blended learning practices. The necessary knowledge management resolutions perform a promising role in the blended learning with the help of technology innovation. The higher education institutions are interestingly developing, adopting, implementing, and practicing blended learning techniques where the influence of knowledge management practices play an important role on students' engagement through blended learning (Galvis, 2018).

The teaching and learning paradigm of education has been severely disrupted during COVID-19 pandemic, and specifically the closure of educational institutions due to lockdown regulations. Campus based teaching sessions in HEIs got cancelled during the lockdown and other teaching arrangements such as blended learning methods are greatly adopted for students' learning, attaining, and assessing (Snelling, 2022). This restructuring in the HEIs presented a sharp growth in the application of web portals whereas academics in higher education institutions have had to swiftly adjust their teaching delivery to the changing environments and to promote blended teaching and guided learning practices for students' learning using different tools such as Microsoft Teams, Collaborate, Zoom, Google Classrooms, and educational software such as Canvas and Moodle (Huang et al., 2020). The blended learning platforms are continuously developed to ensure a better use of the real potential

of digital technology whereas enhancing students' learning experience because of innovative methods (Nair and Munusami, 2020; Hargitai et al., 2021; Al-Omoush et al., 2022).

The HEIs as learning organisations are now required to play an important part in the knowledge-based economy though universities being the centre of excellence are proficient to spread knowledge, skills, and expertise whereas facilitating to prepare top quality graduates for employability and economic growth (Ramirez-Solis et al., 2022). The advancement in technological development plays crucial role in the continuous creation and development of knowledge as an intellectual capital (Aljuboori et al., 2022). At the same time, this is apparent that the universities remain as the hub of expertise or source of knowledge whereas the HEIs mission as well as the fundamental purpose ensures to create, process, store, disseminate, and implement knowledge for the overall vintage of the economic growth of the nation.

In the current global scenario where knowledge driven economy is indispensable, which is supported by technology innovation to set a new paradigm within HEIs for academic, research and enterprise activities through blended learning (Powell and Claxton, 2019). The knowledge based blended learning practices in the higher education seeks to further promote acquisition of soft skills and knowledge sharing by supporting best practices in academic, research, and enterprise activities. This is now becoming obvious that teaching and learning practices in the HEIs are required to be influenced by knowledge management on students' engagement through blended learning in the post COVID-19 era (Castro, 2019).

2. Literature review

The interpretation of blended learning in the higher education spotlights various provocations related to guided learning although this can be sometime classified inappropriately when the narrative lacks precise description in the right context (Armellini, et al., 2021; Bidarra and Rusman, 2017). It is believed that 'blended learning' might be enormously creative teaching method by describing a guided learning techniques as stated by two prominent authors i.e., Garrison and Vaughan (2007). They defined 'blended learning' in their book, *'Blended Learning in Higher Education clearly demonstrates how the blended learning approach embraces the traditional values of face–to–face teaching and integrates the best practices of online learning. This approach has proven to both enhance and expand the effectiveness and efficiency of teaching and learning in higher education across disciplines'* (Garrison and Vaughan, 2007). Despite inconsistent descriptions, a blended learning approach possesses particular abilities to intensify the HEIs' competences precisely (Nair and Manusami, 2020).

2.1 The concept of knowledge management in the HEIs

The use of VLEs for students' engagement through KM and blended learning in HEIs is becoming invaluable for several reasons such as addressing students' learning needs for flexibility, agility, and responsiveness. The core idea behind blended learning is to restructure the teaching and learning practices in the HEIs to get the best out of academic expertise for knowledge sharing (Galvis, 2018). The academic experts who are the knowledge specialists and exist as the centre of excellence specifically for students' engagement to attain learning outcomes effectively. The literature highlights a significant academic contribution in the blended learning application from the perspective of knowledge management though it remains a challenging process (Shahzad et al., 2020). However, the knowledge specialists are anticipated to better scrutinise the restructuring pedagogy excellence while efficiently fostering knowledge driven blended learning, which can enhance students' skills, awareness, and performance through knowledge-based blended learning activities (Azizan et al., 2022). In the technology-oriented approach, Information Technology (IT) is a main driving force for KM and blended learning to enable the creation, distribution, and renovation of knowledge (Williamson et al., 2021).

In the HEIs, KM practices are distinctive sort of information management that aimed for capturing, codifying, creating, communicating, storing, transferring, retrieving, and using of best practices. The fundamental concept of the knowledge-based approach in HEIs is to support staff of the institution to have straightforward access to the codified knowledge, access to the sources of information for solving various academic and administrative problems (Alghail et al., 2021). This encourages the importance of incorporating a knowledge sharing culture in the HEIs to succeed as there is always a risk of losing or forgetting the acquired knowledge. The stream of knowledge sharing needs to be communicated rather than just storing or recording it (Kumar et al., 2022). Viju (2010) presented a general KM framework provides a base for blended learning as shows below in Figure 1.

KM framework is required to continuously disseminate the relevant information to the staff and students at the time when they need it, which can further enhance the efficiency instigating a competitive advantage for HEIs.

In simple words, KM approaches are needed to be designed to support KM processes can be deployed with the expectation that HEIs will have a constructive impact on enhanced performance (Sunalai, 2015). The concept of KM in higher education is the process of creating, disseminating, using, and organising the information and knowledge of any HEIs (Nair and Munusami, 2020). This notion is considered as a multidisciplinary method in accomplishing organisational strategic plan by applying the best use of knowledge (see Figure 1).

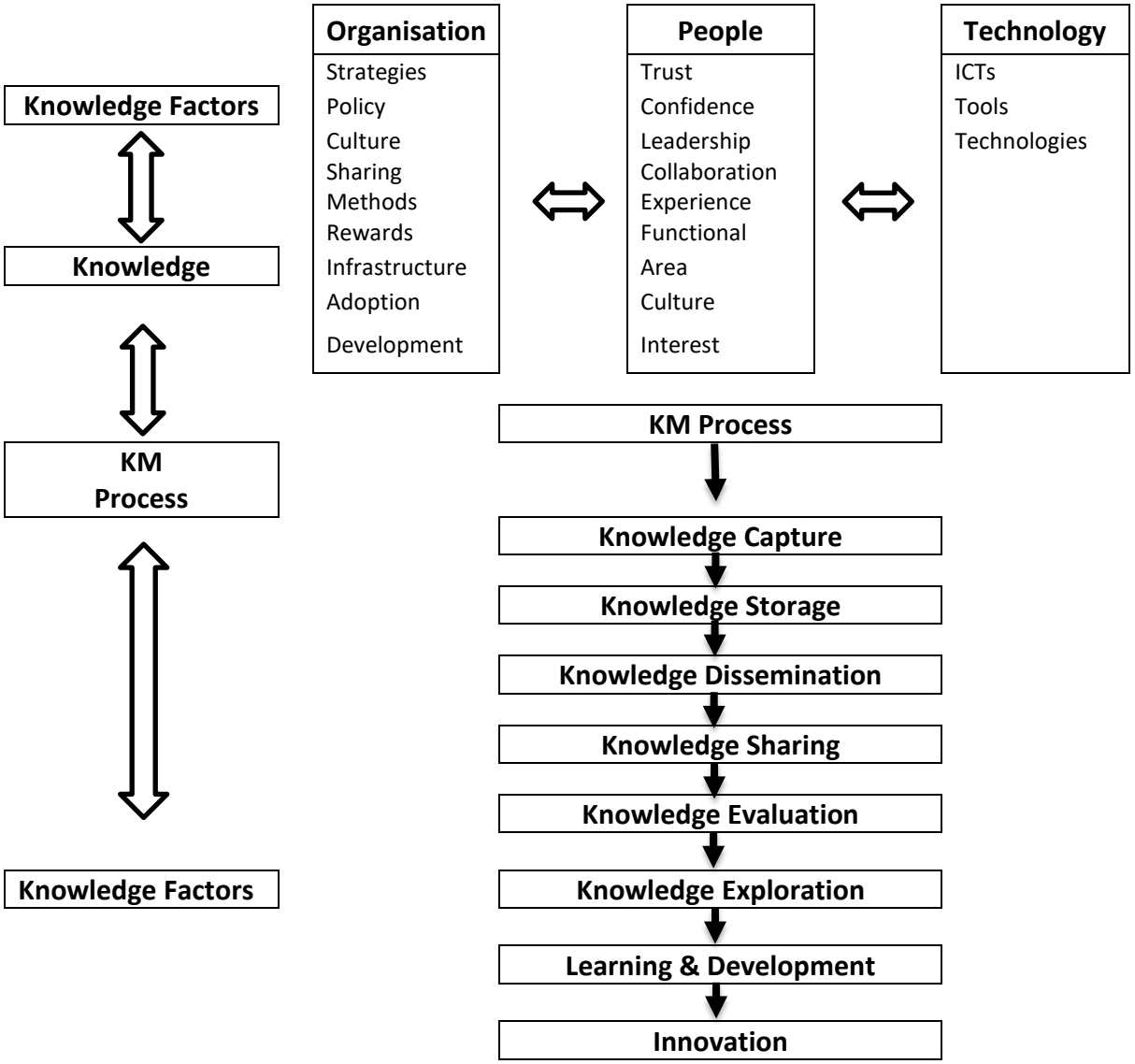

Figure 1: Conceptual Model of KM Framework (Viju, 2010)

2.2 The role of KM in higher education

The HEIs are already playing an essential role in creating, managing, organising, applying, and sharing knowledge to students and academics. This is crucial for the HEIs to remain dynamic and agile in responding to a knowledge-based blended learning being a learning organisation whereas keep playing a viable role based on the knowledge management strategic plan (Zyngier, 2021). The HEIs are comprised of many stakeholders such as academics, admin staff, learners, researchers, enterprises, and academic partners though each of these stakeholders generate and disseminate explicit and tacit knowledge in different dimensions. The utmost goal of HEIs is to keep imparting an explicit and tacit knowledge while making knowledge accessible to many of their internal users through blended learning. This is assumed that the HEIs create and share knowledge with both internal and external stakeholders effectively by transmitting an individual's knowledge with several users by practicing a systematic approach (Finlay et al., 2022).

To bridge the identified gap, this is essential that VLE is deployed to effectively engage students through KM and blended learning as an essential determination to enhance the competitive standing of HEIs while developing

their dexterity for blended learning (Chatterjee at el., 2021). This is equally important that blended learning practices in HEIs progressively support enhanced students' engagement whereas reducing the turnaround timing for academic activities as well as reducing the operations expenses. This means that the HEI achieve the best out of VLE by ensuring an improved academic quality and standard in term of reviewing the curriculum aligned to the students' employability. This identifies how a KM is developed as the fundamental intellectual capacities of academics to provide an excellent learning experience, pedagogy excellence, digital process, and continuous emerging technological advancements (Debaprasad et al., 2022).

2.3 Blended Learning in HEIs

The term blended learning is reviewed broadly in recent literature, emphasizing on the statistical analysis such as meta-analysis that examines the effectiveness of technology employed in KM and blended learning (Castro 2019; Auvinen et al., 2015). The knowledge based blended learning ecosystem covers wide range of practices such as in campus face-to-face interaction, online guided materials, discussion forums, synchronous conversation, announcement, assessments, and feedback. This indicates that the blended learning platforms supported by VLE provide robust students' support while ensuring new prospects for them. Blended learning support students to remain effectively engaged during their studies whereas continuously enriching their learning experience by online facilities (Al-Omoush et al., 2022).

On the other hand, the design of blended learning environment is based on various challenges including integrated flexibility, enhanced interaction, students' learning support and an encouraging students' engagement as described by Chuang et al., (2018). Similarly, the blended learning approach is considered to provide students an opportunity to continuously enhance their skills, knowledge, and performance while developing a positive attitude towards learning outcomes (Gopalan et al., 2018). In similar note, the blended learning provides a teamwork, collaboration, diversity, critical analysis and problem-solving in the course studying activities. However, this is vital that such learning activities could be created in such a way to stimulate interactions among students and their lecturers for enhanced engagement and improved performance (Kopcha et al., 2015).

3. Methodological approach

A cross-sectional quantitative method is used in this research to examine the use of VLE for students' engagement through KM and blended learning. The students' enhanced engagement through KM and blended learning questionnaire is developed 'KMSEBL'© consisting of five essential demographic components whereas comprising 12 close-ended substances under three main dimensions to assess students' effective engagement. The four fundamental questions were about participants' age, gender, ethnicity, field of study, and mode of study although the three dimensions comprised of students' cognitive, emotional, and behavioural engagement. Each selected dimension is clustered with its set of close-ended substances i.e., four items are assigned to emotional engagement(1x4), four items are assigned to analytical engagement (1x4), and four items are assigned to the behavioural engagement (1x4).

The questionnaire survey with 12 close-ended questions within the three underlined dimensions is employed to assess students' engagement in blended learning. The close-ended items appear in a variety of structures, though the questionnaire is clearly defined in an explicit layout for participants. The KMSEBL questionnaire consists of a five-point Likert type scale for all the 12 substances ranging from strongly disagree (1) to strongly agree (5). According to Farrell (2016) the closed-ended questions are often good for surveys, because the researcher gets higher response rates whereas participants do not have to say or type so much. This indicates that a close ended questionnaire can easily be analysed statistically, which is useful to carry out any survey data.

In this study an online questionnaire approach is applied to invite some 300 students specifically at level-6 and level-7 studying various courses in the HEIs in UK. The participants in this study are asked for their consent to voluntarily take part in this study by their free choice. The research ethics is taken in consideration and students could access and complete the questionnaire anonymously and voluntarily. The data is collected through an online survey, after the online questionnaire is distributed among students to be completed by all the participants after their prior consent.

The initially targeted 300 students, and in the end some 251 responses are received. However, there are 23 outlier responses, which is considered as out of scale ranging maximum or minimum ratings only. However, there are 11 misfit responses and after omitting the misfit responses. Finally, 217 responses are processed for

final analysis with 72.22% success rate as shown below in the Table 1. The collected data from successful completed questionnaire is interpreted and inserted into the data analysis spreadsheet for data analysis to generate the research result. The analysed data is further introduced to the Rasch analysis to make available by applying a participants' score scale while expressing the use of VLE for students' engagement through KM and blended learning. The Rasch analysis provided a unique approach of mathematical modeling based upon a rating scale, which is adopted as a common method of research data collection and analysis.

Table 1: Data Collected from Students' Responses (N=217)

Factor	Description	Number	Percentage
Gender	○ Male	*102*	*47%*
	○ Female	*115*	*53%*
Age	○ 24 and below	*65*	*30%*
	○ 25–34 years old	*134*	*62%*
	○ 35 and above	*18*	*8%*
Ethnicity	a) White British	62	29%
	b) Other White	26	12%
	c) Mixed	12	5%
	d) British African-Caribbean	13	6%
	e) British Asian	25	12%
	f) British Chinese	19	9%
	g) Others	60	27%
Field of Study	a) Computing, Engineering & Technology	78	36%
	b) Health, Medicine and Nursing	46	21%
	c) Social Science, Law, and Business	42	19%
	d) Arts, Film, Media, and Music	12	6%
	e) Hotel, Tourism and Hospitality	34	16%
	f) Sports and Education	5	2%
Programme	○ Full Time	202	93%
	○ Part Time	15	7%

3.1 Research analysis model

The role of VLE for students' engagement through KM and blended learning is expressed as a source of judgement, experience, opinion, or attitude in students' engagement effectively. The latent trait theory is applied to understand students' engagement behaviour that's why certain students have a particular trait that could be a reason for their engagement in blended learning (Rajabalee and Santally, 2021). These might be invisible attributes, which could not be easily observed directly. The latent trait theory is applied for such reason to assess students' engagement through KM in blended learning. The 'KMSEBL' questionnaire as an instrument is applied to collect data, then the Rasch measurement model is used for data analysis (Nurulhuda et al., 2018).

The research outcome is applied to further investigate students' engagement through KM and blended learning within the HEIs amassed on age, gender, ethnicity, field of study, and mode of programme applying the expressive data. The descriptive statistics such as the mean, median, standard of deviation, scores, logarithm, value of substances, and value of student. The average calculation is in the structure of logit scale. Therefore, if the value of substance is positive, the student is supposed to be clearly engaged in the blended learning as per the mean. If the logit value is negative, this means student is disengaged in the blended learning. This verified that the higher logit value indicates the higher levels of students' engagement in their HEIs.

3.2 Data validation

The research result is validated by applying the latent trait theory to ensure the reliability of the 'KMSEBL' instrument. A double value consists of both students and substances scoring to use in the rating scale model. The twelve close-ended substances are valued for all successful 217 responses in context of the blended learning. The Rasch model approach is applied to calculate values from responses based on students' demographic dimensions. The substances are initially positioned null, which allowed to gauge the tolerance level for student's engagement in blended learning.

Table 2 below illustrates the 'KMSEBL' instrument as a student's Separation Index (3.36) and the substance's Separation Index (7.62). The value from student's Separation Index and substance's Separation Index provided an evaluation about the 'KMSEBL' reliability. This provided the ability to identify how well the tool illustrated to differentiate among 'student's capabilities' in terms of the latent trait and how extensively the substances are distinguishing between the simple and complicated substances (Hamed and Al-Eideh, 2020; Jeong, 2022). The higher the Separation Index value, the more likely participants respond appropriately to the substances. The 'KMSEBL' tool in this research study illustrates a decent value spread within the grading range of items approving the process fit for purpose as a reliable method by identifying students' engagement in blended learning. The 'KMSEBL' tool provided a satisfactory single measurement (57.3%), with its fundamental variance above the standard of 50% (Li et al., 2021). This clearly demonstrated how to effectively measure students' engagement in the blended learning activities.

Table 2: Summary of Person and Item Separation Index

	Students	**Substances**
Separation	3.36	7.62
Reliability	0.94	0.97
Cronbach's alpha	0.941	
Chi-square (χ2) Raw variance explained by measures	57.3%	

** $p < 0.01$

The calculated values advocated the chi-square (χ2) statistic, which is applied to measure the difference between the examined and anticipated values of the variables. This provided the outfit mean-square statistics for both student and substance close to 1.0, which is endorsed by a substantial level of chi-square score for data reliability model (Boone et al., 2014; Engelhard, 2013). However, the grade ratio analysis in Table 3 below suggests the five-rating scale (strongly agree to strongly disagree). The Likert scale is applied to identify how students easily understand with the upper limit such as grading scale of 1.0 to 5.0 (Li et al., 2021; Jeong, 2022). The calculated values demonstrated that there were no disordered tolerances. This indicated that the average student assessed as per the classification is pushed up monotonically with the rating scale variables, which confirms that the Likert scale classifications are justified and well operating.

Table 3: Rating Scale Model Category Statistics for the Total Sample (N=217)

Category	Frequency	Percentage	Average measure	Outfit MNSQ	Step
1 (SD)	85	1%	-2.73	1.19	NONE
2 (D)	1428	19%	-0.17	1.01	-4.24
3 (A)	4366	59%	+2.01	0.97	-0.21
4 (SA)	1513	20%	+4.89	0.98	+4.47

3.3 Data Outcomes: students' engagement through KM and blended learning

The use of VLE for students' engagement through KM and blended learning in the higher education institutions is indicated as data outcomes. From the data collection and analysis, the students' engagement influenced by KM is assessed. As illustrated in the Table 4, the mean value (logit) as per students score, which is calculated 2.12 logit. This suggested that students are highly engaged in their blended learning activities. The standard deviation is calculated of 2.15 that indicated a wide distribution level. However, as per the mean value (logit) of substance, the mean is calculated 0.03 logit and the standard deviation is 0.82. This verifies a wide distribution of scaling across the logit scale in item complexity level as shown in the Table 4.

Table 4: Summary (Logit) Value of Person and Item

	Students	**Substances**
N	217	12
Measures (logit)		
Mean	2.12	0.03
SD, standard deviation	2.15	0.82
SE, standard error	0.06	0.02
Outfit Mean Square		
Mean	0.97	0.97
SD	0.52	0.23

3.4 Data Variation: Differences in students' engagement in blended learning based on gender, age, ethnicity, field of study, and mode of programme

The collected and analysis of data in this study further indicated that there is variation in terms of students' engagement through blended learning in the HEIs. This is verified by applying the analysis of variation (ANOVA). This clearly illustrates that the ethnicity and field of study got a substantially higher difference at $p < 0.05$ as shown in the following table 6. However, the other factors do not show much high variation in statistical calculation including age, gender, and mode of programme delivery.

Table 5: Students' Blended Learning Engagement Level According to Demographics

Factor	Description	Very Low LVP <-1.25	Low LVP <2.25 ≥1.25	Moderate LVP <3.25 ≥2.25	High LVP <4.25 ≥3.25	Very High LVP > 4.25
Gender	○ Male	*7*	*13*	*36*	*24*	*22*
	○ Female	*4*	*15*	*43*	*32*	*21*
Age	○ 24 and below	*4*	*11*	*15*	*33*	*5*
	○ 25–34 years old	*12*	*20*	*26*	*54*	*22*
	○ 35 and above	*1*	*3*	*4*	*6*	*4*
Ethnicity	○ White British	2	6	14	32	10
	○ Other White	1	1	4	14	6
	○ Mixed	0	1	1	7	3
	○ British African-Caribbean	1	1	4	5	1
	○ British Asian	1	4	6	10	4
	○ British Chinese	1	3	1	12	2
	○ Others	5	9	12	24	10
Field of Study	○ Computing, Engineering & Technology	4	7	9	40	18
	○ Health, Medicine and Nursing	2	5	14	18	7
	○ Social Science, Law, and Business	1	4	7	21	9
	○ Arts, Film, Media, and Music	0	1	2	6	3
	○ Hotel, Tourism and Hospitality	2	6	4	17	5
	○ Sports and Education	1	1	1	2	0
Program	○ Full Time	16	21	32	87	46
	○ Part Time	1	1	3	7	3

Table 5 below classifies students into five levels of blended learning engagement (ranging between very high level to low level of engagement). Using the demographic dimension of students and the logit value of person (LVP), the table below suggested in detail about each classified level of participation. This analysis indicates that the demographic factors such as age, gender and ethnicity were having different effects on students' engagement. For-example, the analysis of students' gender observed 46 out of 102 male students (45%) and 53 out of 115 female students (46%) are found in high and very high level of engagement though blended learning. In the average level engagement, there are 36 male students (35%) and 43 female students (37%); students who were low-level engagement was the least (13% and 17% respectively for male and female students).

Table 6: ANOVA of Students' Demographic Variables

No	Demographic Variable	F-test
1.	Gender	1.988
2.	Age	0.208
3.	Ethnicity	3.349*
4.	Field of Study	2.359
5.	Programme	0.797

note: *$p < 0.05$

3.5 Differential Item Functioning (DIF): Respondents' Demographic Factors in Blended Learning Engagement

The advancing phase of data analysis provided further facts to differentiate between the students based on their chosen five set of factors to better understand their engagement through blended learning. The data analysis

outcomes were evaluated applying the Differential Item Functioning (DIF) analysis, which indicated that students' various subgroups responded in a different way to the elevated substances (Jamalzadeh et al., 2021). These findings further supported the detection of unique commitment of student at various substances from high to low levels. The data result from the DIF analysis illustrates the examined five factors to achieve significant outcome and for comparative analysis. There are ten items out of twelve, which have shown distinct demographic variables in the DIF. The data elements indicated important variation in responses as highlighted on both sides of the scale size > 0.5 logits, t > 2.0 or p < 0.05 as presented in the following Table 7 which indicates the effective engagement of student in their higher education through KM and blended learning practices.

Table 7: Summary of Differential Item Functioning Based on Students' Demographic Variables

Item	Statement	Demographic with DIF
A1	I am motivated to get engaged when performing online tasks	Gender
E3	I give importance to studying together and getting engaged in online learning with my classmates in a group task	Mode of delivery
D3	I feel my classes are more interesting when performing task online with my classmates.	Field of study
C4	I complete and submit assignments on time online	Field of study and Age
B5	I try to do my best to get fully engaged through blended learning group work.	Age
A3	I easily access the guided learning materials from the VLE	Gender
B3	I use reading materials through blended learning using VLE online before attending classes	Age
A2	I am capable to discuss assignments with my classmates using my university's learning management systems	Gender, Filed of Study

4. Conclusion

The outcome of this study reveals the role of VLE for students' effective engagement through KM and blended learning in their higher education attainment. The collected data valuation suggested how certain variations such as gender, age, ethnicity, field of study, and mode of their course delivery could affect the students' engagement. This indicated that support of virtual learning environment further facilitates blended learning practices as per students' motivation, competency, knowledge, behaviour and soft skills aptitude. This study examines how pedagogy excellence is essential to ensue knowledge management supported by agile processes and innovative technology to foster students' high levels engagement through blended learning, which requires good understating and well-planned strategies to be in practice (Roe et al., 2022). However, this study got some limitation on its own; for-example the sample size of participants is quite small as collected data within faculties of the same institution in the same country.

This study is proposing further research in the future studies focusing the concept of blended learning across wider range of HEIs within UK and abroad for comparative analysis. Similarly, this study faced constraint because of only quantitative data without applying the qualitative methods for cross-functional research analysis. In the same context, this is recommended to carry out further research adding qualitative data through open ended substances in the interview format. Moreover, the additional research study will examine how and why VLE is needed for students' engagement through blended practices. The future study will investigate what specific KM and blended learning activities are crucial in engaging students effectively from diverse demographic, geographic, psychographic groups. This will substantially enhance the existing body of knowledge and understanding about various other substantial factors. In conclusion, this is necessary in future research to focus how KM and blended learning are employed within the higher education institution's strategic planning.

References

Abass, O.A., Arowolo, O.A. and Igwe, E.N., 2021. Towards enhancing service delivery in higher education institutions via knowledge management technologies and blended e-learning. International Journal on Studies in Education (IJonSE), 3(1), pp.10-21.

Alghail, A., Abbas, M. and Yao, L. (2021) Where are the higher education institutions from knowledge protection: a systematic review. VINE Journal of Information and Knowledge Management Systems. Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/VJIKMS-09-2020-0166

Aljuboori, Z. M., Singh, H., Haddad, H. Al-Ramahi, N. M. Ali, M. A. (2022) Intellectual capital and firm performance correlation: the mediation role of innovation capability in malaysian manufacturing SMEs perspective. MDPI; Vol: 14, Iss: 02. doi:10.3390/su14010154. https://www.mdpi.com/2071-1050/14/1/154

Al-Omoush, K. S., Palacios-Marques, D. and Ulrich, K. (2022) The impact of intellectual capital on supply chain agility and collaborative knowledge creation in responding to unprecedented pandemic crises. Technological Forecasting and Social Change. Vol: 178, Iss: 01. ISSN 0040-1625. https://doi.org/10.1016/j.techfore.2022.121603

Armellini, A., Teixeira Antunes, V. and Howe, R. (2021) Student perspectives on learning experiences in a higher education active blended learning context. T*ech-Trends*. Vol: 65, Iss: 01, pp: 433–443. https://doi.org/10.1007/s11528-021-00593-w

Auvinen, T., Hakulinen, L. and Malmi, L. (2015) Increasing students' awareness of their behaviour in online learning environments with visualizations and achievement badges. IEEE Transactions on Learning Technologies. Vol: 08, Iss: 03, pp: 261-273

Azizan, S., Lee, A., Crosling, G., Atherton, G., Arulanandam, B., Lee, C. and Abdul Rahim, R. (2022) Online learning and covid-19 in higher education: the value of it models in assessing students' satisfaction. *International Journal of Emerging Technologies in Learning (iJET).* Vol: 17, Iss: 03, pp: 245-278. https://www.learntechlib.org/p/220505

Bidarra, J and Rusman, E. (2017) Towards a pedagogical model for science education bridging educational contexts through a blended learning approach. Open Learning. The Journal of Open, Distance and E-Learning. Vol: 32, Iss: 01, pp: 06-20

Castro, R. (2019) Blended learning in higher education: Trends and capabilities. Education and Information Technologies. Vol: 24, Iss: 01, pp: 2523–2546. https://doi.org/10.1007/s10639-019-09886-3

Chatterjee, S., Chaudhuri, R. and Vrontis, D. (2021) Knowledge sharing in international markets for product and process innovation: moderating role of firm's absorptive capacity. International Marketing Review. Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/IMR-11-2020-0261

Chuang, H. H., Weng, C. Y. and Chen, C. H. (2018) Which students benefit most from a flipped classroom approach to language learning? British Journal of Educational Technology. Vol: 49, Iss: 01, pp: 56-68

Debaprasad, M., thakur, M. and sundar, G. (2022) Generic course outcomes for internationally evolving futuristic outcome-based technology education and a model of their implementation. Educational Neuroscience, Available at https://ssrn.com/abstract=4023579

Finlay, M. J., Tinnion, D. J. and Simpson, T. (2022) A virtual versus blended learning approach to higher education during the COVID-19 pandemic: the experiences of a sport and exercise science student cohort. Journal of Hospitality, Leisure, Sport and Tourism Education. Vol: 30, Iss: 01. https://doi.org/10.1016/j.jhlste.2021.100363

Galvis, A. H. (2018) Supporting decision-making processes on blended learning in higher education: literature and good practices review. Internal Journal of Education Technology in Higher Education; Vol: 15, Iss: 25. https://doi.org/10.1186/s41239-018-0106-1

Garrison, D. R. and Vaughan, N. D. (2007) Blended learning in higher education: framework, principles, and guidelines. Jossey Bass

Gopalan, C., Bracey, G., Klann, M. and Schmidt, C. (2018) Embracing the flipped classroom: the planning and execution of a faculty workshop. Advances in Physiology Education. Vol: 42, Iss: 04, pp: 648-654

Hamed, M. M. Al-Eideh, B. M. (2020) An exploratory analysis of traffic accidents and vehicle ownership decisions using a random parameters logit model with heterogeneity in means. *Journal for Analytic Methods in Accident Research*. Vol: 25, Iss: 01, pp: 106-123. ISSN 2213-6657. https://doi.org/10.1016/j.amar.2020.100116

Hargitai, Dávid M., Florina Pinzaru, and Zoltán Veres. 2021. "Integrating Business Students' E-Learning Preferences into Knowledge Management of Universities after the COVID-19 Pandemic" Sustainability 13, no. 5: 2478. https://doi.org/10.3390/su13052478

Huang, R., Tlili, A., Chang, TW., Zhang, X., Nascimbeni, F. and Burgos, D. (2020) Disrupted classes, undisrupted learning during COVID-19 outbreak in China: application of open educational practices and resources. Smart Learning Environments; Vol: 04, Iss: 19. https://doi.org/10.1186/s40561-020-00125-8

Jamalzadeh, M., Lotfi, A. R. and Rostami, M. (2021) Assessing the validity of an IAU General English Achievement Test through hybridizing differential item functioning and differential distractor functioning. *Language Testing Asia.* Vol: 11, Iss: 08 https://doi.org/10.1186/s40468-021-00124-7

Jeong, S. (2022) Posterior contraction in group sparse logit models for categorical responses. *Journal of Statistical Planning and Inference*. Vol: 219, Iss:01, pp: 266-278. ISSN 0378-3758. https://doi.org/10.1016/j.jspi.2022.01.001

Kopcha, T. J., Orey, M. and Dustman, W. (2015) Exploring college students' online help-seeking behavior in a flipped classroom with a web-based help-seeking tool. Australasian Journal of Educational Technology. Vol: 31, Iss: 05

Kumar, M., Mamgain, P., Pasumarti, S.S. and Singh, P.K. (2022) Organizational IT support and knowledge sharing behaviour affecting service innovation performance: empirical evidence from the hospitality industry. VINE Journal of Information and Knowledge Management Systems. Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/VJIKMS-07-2021-0124

Li, Y., Song, L. and Fan, W. (2021) Day-of-the-week variations and temporal instability of factors influencing pedestrian injury severity in pedestrian-vehicle crashes: A random parameters logit approach with heterogeneity in means and variances. *Analytic Methods in Accident Research*. Vol: 29, Iss: 01, pp: 213-247. ISSN 2213-6657. https://doi.org/10.1016/j.amar.2020.100152

Nair, V. B. and Munusami, C. (2020) Knowledge management practices: An exploratory study at the Malaysian higher education institution, Journal of Research in Innovative Teaching and Learning. Vol: 13, Iss: 02, pp: 174-190. https://doi.org/10.1108/JRIT-01-2019-0008

Nurulhuda, S., Yasin, T. M., Fauzi, M., Yunus, M. Ismail, I. (2018) The use of rasch measurement model for the validity and reliability. *Journal of Counselling and Educational Technology*. Vol: 01, Iss: 02, pp: 22-27. DOI: https://10.32698/0111

Powell, G. and Claxton, G. (2019) Powering up students: the learning power approach to high school teaching (the learning power series). kindle Edition. Crown House Publishing

Rajabalee, Y. B. and Santally, M. I. (2021) Learner satisfaction, engagement and performances in an online module: Implications for institutional e-learning policy. Education and Information Technology. Vol: 26, Iss: 01, pp: 2623–2656. https://doi.org/10.1007/s10639-020-10375-1

Ramirez-Solis, E. R., Rodríguez-Aceves, L. and Banos-Monroy, V. I. (2022) University based entrepreneurship ecosystems: the role of the sustainable family business theory and entrepreneurship education. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-87865-8_16

Roe, Y., Wojniusz, S. and Bjerke, A. H. (2022) The digital transformation of higher education teaching: four pedagogical prescriptions to move active learning pedagogy forward. Frontiers in Education. Vol: 06, Iss: 01. doi: 10.3389/feduc.2021.784701

Shahzad, A., Hassan, R., Aremu, A. Y., Hussain, A., and Lodhi, R. N. (2020). Effects of COVID-19 in e-learning on higher education institution students: the group comparison between male and female. Quality and Quantity. https://doi.org/10.1007/s11135-020-01028-z

Snelling, C. (2022) Lessons from the pandemic: making the most of technologies in teaching. Publications. UK universities. Available at https://www.universitiesuk.ac.uk/what-we-do/policy-and-research/publications/lessons-pandemic-making-most [Access on March 15, 2022]

Sunalai, S. (2015) Knowledge management systems in higher education institutions in thailand: a holistic model of enablers, processes, and outcomes. doctoral dissertation. Texas A and M University. Available electronically from https://oaktrust.library.tamu.edu/handle/1969.1/156246 [Accessed March 15, 2020]

Viju, M. (2010). Knowledge management in higher education: Implementation agenda in distance learning. 4 th International Conference on Distance Learning and Education, pp. 155-158

Williamson, B., Macgilchrist, F. and Potter, J. (2021) Covid-19 controversies and critical research in digital education. Learning, Media, and Technology. Vol: 31, Iss: 01, pp: 117 - 127. https://doi.org/10.1080/17439884.2021.1922437

Zyngier, S. (2021) Enhancing academic research and higher education with knowledge management principles: advances in knowledge acquisition, transfer, and management. Information Science Reference