persuasive leadership, effective communication, strict supervision, and efficient motivation, the institution can foster stability and balance, leading to long-term sustainability and growth in the market. Therefore, the evaluation of directing practices provides valuable guidance for the management of WCC Aeronautical Technological College to enhance its leadership strategies, improve employee performance, and create a more cohesive and effective learning environment. By leveraging the identified strengths and addressing areas for improvement, the institution can further strengthen its position as a reputable educational institution, nurturing a culture of excellence, and ensuring the success of its students, staff, and stakeholders alike.

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CHARACTERIZING GRADUATE FACULTY UTILIZATION OF LEARNING MANAGEMENT SYSTEM (LMS): A CLASSIFICATION APPROACH

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Abstract

Learning Management Systems (LMS) are crucial tools for supporting online education in the digital age. This study aims to categorize the graduate faculty based on Learning Management System (LMS) use. It is essential to comprehend how graduate professors use LMS to improve online learning efficiency. The Hierarchal Cluster analysis using the Ward method identified three significant clusters—however, the post hoc test identified only Cluster 1 and 2 as reasonable groupings. Cluster 1 comprises 28 graduate faculty members with significantly more synchronous and asynchronous use than the 35 faculty members in Cluster 2. Faculty in cluster 1 are inclined to use the asynchronous more than the synchronous feature of LMS. Conversely, faculty in Cluster 2 prefer using synchronous more than the asynchronous feature of the LMS. The discriminant function identified the level of synchronous and asynchronous use that significantly characterize faculty in Cluster 1 and 2. By offering a methodical method for describing faculty use of an LMS, this study adds to the body of knowledge already available. The research's conclusions can help create specialized programs for faculty development and raise the standard of online instruction. Additionally, other educational environments can use the classification strategy described in this study to understand better how teachers interact with LMS platforms.

Keywords: Graduate Faculty, Learning Management Systems, Digital Age, Asynchronous

Introduction

Learning Management Systems (LMS) have become integral to higher education institutions' teaching and learning process. LMS platforms provide graduate faculty with a centralized and organized platform to deliver course content, assignments, and resources to students (Al-Fraihat, Joy, Masa'deh & Sinclair, 2020). An efficient utilization of a centralized approach, the setup ensures students access materials and instructions quickly, promoting efficient course delivery. More than ever, graduate faculty need to deliver online courses effectively. The LMS platforms enable students to access educational resources and participate in discussions remotely (Lowenthal, Borup, West & Archambault, 2020). With greater flexibility in course delivery, faculty conveniently caters to the diverse needs of graduate students, including working professionals and those residing in different geographic locations.

The current virtual learning environment needs an adequate medium of communication. Various communication tools are available in the LMS, such as discussion boards, email, and chat functions, facilitating seamless communication between graduate faculty and students (Lachheb & Boling, 2018.) These features encourage active engagement, peer interaction, and timely feedback, enhancing the learning experience. Another opportunity LMS offers is a structured and organized environment to manage course materials, including lecture notes, assignments, and multimedia resources (Bozkurt, Karadeniz & Okur, 2015). Centralized storage and accessibility of materials streamline course administration, reducing the risk of information loss or disorganization.

Enabling graduate faculty to manage and evaluate student performance efficiently is another convenience LMS offers to faculty. LMS platforms offer tools for online assessment, grading, and feedback (Brown, Lawrence, Basson, Axelsen, Redmond, Turner & Galligan, 2022). Features such as online quizzes, automated grading, and rubrics simplify the assessment process, saving time for faculty while providing timely and constructive feedback to students. Faculty members need information to adapt their teaching methods, address student needs, and promote student success. LMS generates essential data and analytics on student engagement, performance, and progress, empowering graduate faculty to identify areas of improvement and tailor instructional strategies (Choi, Lee, Hong, Lee, Recker & Walker, 2016).

Learning Management Systems are pivotal in supporting graduate faculty in delivering effective and engaging educational experiences. They offer numerous benefits, including enhanced course delivery, online learning facilitation, efficient communication and collaboration, organization and management of course materials, streamlined assessment and feedback, and access to data and analytics. The Graduate school's attempt to leverage the capabilities of LMS platforms can enhance the faculty teaching practices, support student learning, and contribute to a dynamic and effective educational environment.

Learning Management Systems (LMS) have become essential tools in graduate education, enabling faculty members to deliver course content, engage with students, and manage assessments and grades. However, despite their benefits, LMS platforms pose particular challenges for graduate faculty members, such as technical challenges attributed to system complexity since most LMS platforms present complex user interfaces making it difficult for graduate faculty members to navigate and use the system efficiently (Widodo & Slamet, 2022). It is also possible for faculty to encounter LMS platforms with compatibility issues with other technologies they intend to use, resulting in difficulties in integrating various systems (Choi et al., 2016). Further, more technical support from the LMS provider is needed to ensure the effective use of the system (Bozkurt et al., 2015).

There are two basic settings in online learning, synchronous and asynchronous. Synchronous online learning is real-time interpersonal communication using natural language and immediate teacher feedback (Bradley, 2021). The characteristics of synchronous learning furnish personalization similar to face-to-face learning. Especially in a course that required students to learn practical skills, more positive experiences and outcomes occurred in a synchronous online setting (Ogbonna, Ibezim & Obi, 2019). Also, the amount of commitment and task motivation is more significant in synchronous compared to asynchronous learning (Hrastinski, 2008). Considerably synchronous learning presents the challenge of more disengaged students in the class, such as doing other things or passive listening (Smith & Smith, 2014). In videoconferencing, interaction and attention fluency are lower than in traditional teaching (Rapanta, Botturi, Goodyear, Guàrdia, & Koole, 2020). Problems arising from technical infrastructure, which may limit active student participation in a live remote setting, are challenging (Xie, Liu & Bhairma, 2018). Synchronous learning has limitations, such as deep reflection or discussing complex ideas, and synchronous communication is less valuable (Hrastinski, 2010). A setting requiring cognitive achievement, such as meaningful and thoughtful contributions, is greater in asynchronous settings (Ogbonna et al., 2019).

Asynchronous settings are less instructor-dependent, self-paced, student-based, and geographically independent (Xie et al., 2018). Further, the setting needs to be improved in providing immediate feedback, lacking in personalization of learning, and deficient in transmitting verbal and non-verbal communication cues (Bradley, 2021). Consequently, the asynchronous learning environment is less natural than a traditional one, resulting in greater communication ambiguity, cognitive load, and lower activation. However, asynchronous teaching allows students to work independently of time and place (Fabriz, Mendzheritskaya & Stehle, 2021). Not all students possess the appropriate strategies to benefit from this potential advantage. Asynchronous setting demand students' more excellent self-study skills to stay on track, including sufficient motivation and determination to meet learning goals (Peachey, 2017). Also, students must have solid digital skills to perform academic work and complete learning activities (Jung, Kim, Lee, Cathey, Carver & Skalicky, 2019).

In graduate school, the hybrid online learning environment is becoming the preferred delivery of instruction. The hybrid online environment blends synchronous and asynchronous online activities. Since no system is perfect, efforts to achieve the best combination of online learning environments continue. A hybrid or blended model is a potential solution to many problems. The setting combines synchronous and asynchronous teaching, which may have different patterns. A hybrid online environment intends to combine the strength of both synchronous and asynchronous settings.

The past pandemic reconfigured the higher education environment, which ushered in the greater use of technology, creating several pedagogical challenges. For instance, from the traditional teaching environment, the LMS platform challenges the graduate faculty to develop new pedagogical strategies (Al-Fraihat et al., 2020). Formerly a traditional mode of engaging students face-to-face, the current environment allows a virtual engagement in which some LMS platforms need more specific interactive features creating difficulty for graduate faculty to engage students effectively (Saidi, Sharip, Abd Rahim, Zulkifli, & Zain, 2021). Previously in a traditional setting, personalized learning was a tool to address graduate students' diverse needs easily. Conversely, the LMS platform has limited flexibility to accommodate personalized learning experiences (Bolliger & Halupa, 2022).

There are enormous time and workload challenges for graduate faculty to overcome with the major use of LMS. The initial learning curve associated with using LMS platforms is time-consuming for graduate faculty members, as they must familiarize themselves with the system and its functionalities (Redmond, Abawi, Brown, Henderson & Heffernan, 2018). On top of the learning challenges of LMS, the faculty's need to design and develop online courses in an LMS requires significant time and effort from faculty members, adding to their workload (Archambault, Leary & Rice, 2022). In addition, managing and grading assignments, quizzes, and discussions in an LMS requires more time, particularly for large graduate classes (Bolliger & Halupa, 2022).

Learning Management Systems provide numerous benefits for graduate faculty members. However, they also present challenges that must enhance their usability and effectiveness. Graduate faculty face highly profiled technical, pedagogical, and time or workload challenges when utilizing LMS platforms. By understanding and addressing these challenges, the graduate school can better support its faculty members in effectively using Learning Management Systems.

This study aims to characterize the hybrid LMS utilization of graduate faculty in terms of synchronous, asynchronous, and uploading of materials highlighting the possible classification which describes how faculty combine features of LMS to assist them in their pedagogical task.

Review of Literature

This study is based on two theories. For faculty predisposed to using asynchronous LMS, the Transactional Distance Theory of Michael G. Moore (1993) provides insight into understanding the preferred setting focusing on the psychological and communication space between instructors and learners in distance education contexts. According to Moore, transactional distance is reduced by employing appropriate instructional strategies and technologies, such as asynchronous LMS, which positively impact student learning outcomes. Graduate faculty use the asynchronous feature for its convenience and flexibility in allowing students to proceed with discussion and course materials at their convenience and pace. The arrangement reduces the transactional distance by giving learners more control over their learning experiences (Moore, 1993). Asynchronous LMS offers features like discussion boards and online forums, enabling students to engage in self-paced learning, reflection, and in-depth discussions. Through these features, self-regulated learning is promoted among students who take ownership of their learning process, which supports the principles of transactional distance theory, as learners actively participate in the learning process, thus reducing transactional distance and promoting self-directed learning (Moore, 1993).

The importance of cognitive engagement in distance education is part of the transactional distance theory, which gives students time for reflection, critical thinking, and thoughtful responses to course materials and discussions. The level of engagement facilitates deeper learning for students allowed to process and internalize information before providing their input. Graduate faculty prefer asynchronous LMS for its ability to facilitate this cognitive engagement, which aligns with the objectives of graduate-level education (Moore, 1993). The various features of asynchronous LMS allow graduate faculty to design instructional activities that align with the principles of transactional distance theory, promoting student-centered learning, self-regulation, interactivity, and cognitive engagement. These factors enhance graduate students' learning experience in online or blended learning environments.

The second theory is the Cognitive Load Theory from Sweller (1999) for graduate faculty that preferred using synchronous Learning Management Systems (LMS) in student learning with their real-time interaction and immediate feedback, reducing extraneous cognitive load and facilitating effective learning. The synchronous LMS setting allows faculty instructional adjustments based on immediate student feedback and performance. The synchronous arrangement help helps optimize cognitive load by addressing students' individual needs and maintaining an appropriate level of challenge (Kirschner, Sweller, & Clark, 2006). Included as an advantage of the synchronous LMS setting is the enhancement of social presence, which increase the feeling of connectedness and social interaction in online learning environments. The arrangement positively affects cognitive engagement and reduces cognitive load. The real-time interaction in synchronous LMS promotes active participation, discussions, and collaboration among graduate students, leading to deeper learning and improved knowledge retention (Tu & McIsaac, 2002).

The preference of graduate faculty to use synchronous LMS furnishes immediate feedback, which is beneficial for graduate students in detecting and correcting errors. Real-time feedback assists learners in recognizing and addressing misconceptions or misunderstandings promptly. Immediate error detection and correction contribute to a more effective learning process and reduce cognitive load associated with erroneous mental models (Van Merriënboer & Sweller, 2005). The availability of synchronous features in LMS helps faculty design instruction that aligns with cognitive load theory, reducing unnecessary cognitive load, providing timely feedback, and enhancing cognitive engagement among students.

Method

This study aims to determine the significant categories of graduate faculty based on their synchronous, asynchronous, and material upload utilization. Sixty-five graduate faculty members from all graduate programs (Education, Business, Engineering, and Social Sciences) were involved in this study. They have been using the hybrid LMS combination of synchronous and asynchronous use from the past three school years, 2020 to 2023, to the present. The Dean's Office of the Graduate School monitors and records the faculty LMS utilization.

The hierarchal cluster analysis using the Ward method determined the graduate faculty LMS use categories and was considered an alternative approach for cluster analysis. The Ward method uses cluster analysis as a problem instead of distance metrics or association measures. Using the identified cluster as the categorical dependent variable and the degree of synchronous, asynchronous, and materials loaded as the independent variables to develop a discriminant function, the linear combination of the independent variables discriminates between categories of graduate faculty.

Result and Discussion

This study aims to classify the graduate faculty based on their distinct LMS utilization in synchronous, asynchronous, and uploading of materials they deemed most effective in their course delivery. A hierarchical cluster analysis was performed using Ward's method to identify distinct clusters within a dataset of customer preferences based on three variables: synchronous, asynchronous, and materials. Based on the Agglomeration Schedule, a cutoff point was selected to create three distinct clusters. The inter-cluster distances indicated the dissimilarity between clusters. The average dissimilarity values were as follows: Cluster 1 vs. Cluster 2 (50.44), Cluster 1 vs. Cluster 3 (93.25), and Cluster 2 vs. Cluster 3 (42.81).

The resulting cluster solution depicted that Cluster 1 comprises graduate faculty surpassing the four minimum thresholds of synchronous LMS use, averaging at 4.02, asynchronous at 5.29, and an average material upload of 3.75. Cluster 2 is graduate faculty that did not meet the minimum threshold synchronous LMS utilization and average at 3.19 and the lowest asynchronous average of 2.2. However, Cluster 2 has an excellent average of materials uploaded at 5.69. Cluster 3 is graduate faculty with the lowest synchronous average of 3.00 and a lower asynchronous average of 3.5, yet with the highest average material uploaded, 44. Ward's method successfully identified three distinct clusters within the graduate faculty, providing insights into different LMS use based on their preferences.

Table 1. Descriptive Statistic for Clusters

		N	Mean	Std. Deviation	Std. Error
Synchronous	Cluster 1	28	4.02	1.08	0.20
	Cluster 2	35	3.19	1.04	0.18
	Cluster 3	2	3.00	1.41	1.00
	Total	65	3.54	1.13	0.14
Asynchronous	Cluster 1	28	5.29	1.41	0.27
	Cluster 2	35	2.20	1.43	0.24
	Cluster 3	2	3.50	3.54	2.50
	Total	65	3.57	2.11	0.26
Materials	Cluster 1	28	3.75	2.17	0.41
	Cluster 2	35	5.69	3.46	0.59
	Cluster 3	2	44.00	15.56	11.00
	Total	65	6.03	7.72	0.96

In determining if significant differences in the identified three clusters exist in terms of synchronous, asynchronous, and materials, the analysis of variance (ANOVA) was used. In terms of significant synchronous difference existed [F (2,62), 8.567, p =0.001), in asynchronous, the significant difference exists [F (2,62), 22.601, p = 0)] and in materials, a significant difference exists [F (2, 62), 111.402, p = 0)].

Table 2. Test of Difference for Clusters

Analysis of Variance (ANOVA)					F	Sig.
Synchronous	Between Groups	17.68	2	8.84	8.567	0.001
	Within Groups	63.974	62	1.032		
	Total	81.654	64			
Asynchronous	Between Groups	119.724	2	59.862	22.601	0
	Within Groups	164.214	62	2.649		
	Total	283.938	64			
Materials	Between Groups	2980.54	2	1490.27	111.402	0
	Within Groups	829.398	62	13.377		
	Total	3809.938	64			

Specifically, the post hoc test reflected in Table 3 was used to determine which factor and cluster significant difference exist. A significant difference exists in synchronous between clusters 1 and 2 with a mean difference (M = 1.13, p= 0.001). In terms of asynchronous between clusters 1 and 2 with a mean difference (M = 3.00, p= 0) significant difference exists. Significant differences exist in materials between clusters 3 and 1 (M = 38.97, p = 0) and in clusters 2 and 3 (M = 39.63, p = 0). Since cluster 3 does not have a significant difference in synchronous and asynchronous with clusters 1 and 2, the research proceeds to discriminant analysis, classifying clusters 1 and 2.

Table 3. Multiple Comparisons of Clusters Using Scheffe Posthoc Test

Dependent Variable	(I) Ward Method	(J) Ward Method	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Synchronous	1	2	1.13457*	0.27885	0.001	0.4352	1.834
Asynchronous	1	2	3.00359*	0.44676	0	1.8831	4.1241
Materials	3	1	38.97727*	2.64438	0	32.3449	45.6096
Materials	3	2	39.63158*	2.71896	0	32.8122	46.451

** The mean difference is significant at the 0.05 level.*

The objective of discriminant analysis is to develop discriminant functions that are nothing but the linear combination of independent variables that discriminate between the categories of the dependent variable, clusters 1 and 2. It allows the researcher to examine whether significant differences exist between clusters 1 and 2 regarding the predictor variables, synchronous, asynchronous, and materials. It also evaluates the accuracy of the classification.

The hierarchal cluster analysis using the Ward method showed three grouping of graduate faculty. The first cluster comparatively has a higher synchronous and asynchronous use than clusters 2 and 3. Conversely, cluster 2 has a higher synchronous and asynchronous use compared to 3 and a higher material upload than cluster 1. Cluster 3 have a higher material upload than cluster 1 and 2. However, based on the ANOVA and post hoc test reveal that the difference in LMS use between cluster 1 and 2 are the most practical. Hence in the linear discriminant analysis, clusters 1 and 2 are the dependent variables, and the synchronous, asynchronous, and material uploaded are the independent variables.

Table 4 below presents the Group Statistics on the distribution of observations into the two groups within LMS use. Notably, the number of observations falls into each of the two groups. The default weight is 1 for each observation in the dataset, so the weighted number of observations in each group equals the unweighted number of observations in each group

Table 4. Group Statistics

Ward Method		Valid N (listwise)	
Cluster	**Factor**	**Unweighted**	**Weighted**
1	Synchronous	44	44
	Asynchronous	44	44
	Materials	44	44
2	Synchronous	19	19
	Asynchronous	19	19
	Materials	19	19
Total	Synchronous	63	63
	Asynchronous	63	63
	Materials	63	63

Table 5 below provide the statistical evidence of significant differences between means of cluster 1, 2, and 3 in using the synchronous (Λ = 0.784, 1, 61, p<0.05), asynchronous (Λ = 0.559, 1, 61, p<0.01) and uploading of materials (Λ = 0.99, 1, 62, p>0.01) which affect the predictive accuracy of the model in classifying the groups.

Table 5. Tests of Equality of Group Means

	Wilks' Lambda (Λ)	F	df1	df2	Sig.
Synchronous	0.784	16.813	1	61	0
Asynchronous	0.559	48.134	1	61	0
Materials	0.99	0.59	1	61	0.445

Table 6 also supports using these independent variables in the analysis as intercorrelations are low. Specifically, the intercorrelations between synchronous and asynchronous are -0.126, and with materials are -0.114. The intercorrelations between asynchronous and material are -0.177.

Table 6. Intercorrelations among the independent variables

		Synchronous	Asynchronous	Materials
Correlation	Synchronous	1	-0.126	-0.114
	Asynchronous	-0.126	1	-0.177
	Materials	-0.114	-0.177	1

In addition, Table 7 displayed the associated chi-square statistic tests the hypothesis that the means of the functions synchronous, asynchronous, and materials uploaded listed are equal across groups. The chi-square result ($\chi 2$ = 50.218, 3, p<0.01) indicates that the discriminant function does better than the chance of separating the groups.

Table 7. Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	0.43	50.218	3	0

Table 8 exhibited the derived discriminant functions was D1 = 0.601(synchronous) + 0.573(asynchronous) + 0.101 (materials uploaded) -4.671. The functions provide a linear combination of the predictor variables for classifying graduate faculty LMS utilization.

Table 8. Canonical Discriminant Function Coefficients

	Function
	1
Synchronous	0.601
Asynchronous	0.573
Materials	0.101
(Constant)	-4.671

Unstandardized coefficients

These eigenvalues describe a high discriminating ability for the function is 100 percent. The magnitudes of the eigenvalues indicate the functions' discriminating solid abilities.

Table 9. Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1.326[a]	100	100	0.755

[a] *First 1 canonical discriminant functions were used in the analysis.*

Based on the classification report in Table 10, it is observable that from the row total, 44 faculty members fall into Cluster 1, and 19 falls into Cluster 2. Of the 44 faculty members in Cluster 1, all fall correctly, or 100 percent, in cluster 1, and of the 19 faculty members in Cluster 2, 18, or 94.7 percent, were predicted correctly.

Table 10. Classification Result [a]

Ward Method			Predicted Group Membership		Total
			Cluster 1	Cluster 2	
Original	Count	Cluster 1	44	0	44
		Cluster 2	1	18	19
		Ungrouped cases	2	0	2
	%	Cluster 1	100	0	100
		Cluster 2	5.3	94.7	100
		Ungrouped cases	100	0	100

[a] *98.4% of original grouped cases correctly classified.*

The result of the discriminant analysis depicted that the synchronous and asynchronous variables significantly separate cluster 1 from cluster 2. Graduate faculty in cluster 1 significantly use more than synchronous and asynchronous features of LMS compared to cluster 2. However, cluster 2 graduate faculty uses more synchronous features than asynchronous compared to cluster 1, which uses more asynchronous compared to synchronous.

The tendency of the graduate faculty in cluster 1 to use asynchronous more than synchronous in LMS is attributed to several reasons, such as depicted in the Transactional Distance Theory, which suggests that asynchronous LMS provides flexibility in terms of time and place, diminishes the transactional distance between learners and instructors. The setting allows learners to work at their own pace and engage in self-regulated learning, which may lead to higher motivation and satisfaction (Moore, 1993). In graduate-level education, some topics are complex and require deeper analysis and thoughtful reflection. Discussion forums or threaded discussions, a feature in the asynchronous LMS, provide a platform for extended and in-depth discussions that allow learners to contribute well-considered responses (Copeland & Wattiaux, 2011).

The graduate programs include diverse students from different geographic areas, cultural backgrounds, and time zones. The asynchronous LMS features accommodate these variations and ensure that all students have equal opportunities to participate and contribute, irrespective of their geographic situation (Zhang, Zhou, Briggs, &

Nunamaker Jr, 2006). Most courses in graduate school need more comprehensive and in-depth learning experiences. The asynchronous LMS features offer more time for students to engage in reflective thinking, critically analyze course materials, and formulate thoughtful responses (Harley, Phillips, & Maher, 2019). Notably, the extent to which a graduate faculty use the asynchronous LMS features depends on the course context, preference, and objectives

Conversely, graduate faculty in Cluster 2 preferred using synchronous platforms often compared to asynchronous ones based on the Cognitive Load Theory. The theory proposes that courses needed greater synchronous use in the LMS. The setup allows real-time interactions and immediate feedback, which diminish cognitive load by providing timely support and guidance to learners. The arrangement boosts learning outcomes (Sweller, 1999). Supporting this theory is another theory called Social Presence Theory suggests synchronous LMS facilitates real-time communication and collaboration and creates a stronger sense of social presence among learners. The situation enriches engagement and promotes a sense of community, leading to greater learning outcomes (Short, Williams, & Christie, 1976).

Graduate faculty deemed that the real-time communication features are more suitable for complex and indistinct tasks that require immediate feedback and high levels of interactivity. On the other hand, asynchronous LMS, with its text-based communication and delayed responses, may be better suited for simple and routine tasks (Daft & Lengel, 1986). Some graduate faculty are more comfortable in real-time interaction and engagement with students. The synchronous setting facilitates dynamic discussions, live Q&A sessions, and collaborative activities, which are especially valuable in graduate-level education where in-depth discourse and critical thinking are necessary (Kanuka & Anderson, 1998).

Graduate faculty wanting to foster community, connection, and support is particularly beneficial in graduate programs where networking and building professional relationships are essential (Gunawardena & McIsaac, 2004) preferred synchronous LMS features, such as video conferencing or live chat. Especially in courses that required real-time guidance, clarifying complex concepts, and promptly addressing students' questions, facilitating a deeper understanding of the subject matter (Swan, 2001). There are instances when a specific topic requires faculty to engage in one-on-one or small-group mentoring sessions with students. Virtual interactions are critical in graduate school, where faculty act as mentors guiding students through research projects, thesis/dissertation work, and professional development (Kram & Isabella, 1985). Most often, graduate faculty wanted to cultivate greater accountability and commitment among students, as they are expected to participate and contribute during the designated time slots actively. Synchronous LMS activities, such as live lectures or virtual seminars, enhance student motivation and study dedication (Picciano, 2002).

Conclusion and Recommendation

The hierarchal cluster analysis using the Ward method depicted the presence of three graduate faculty clusters based on the level of hybrid LMS use. Only the first and second clusters were reasonable since significant differences existed in their synchronous and asynchronous LMS use. Cluster 1 significantly uses synchronous and asynchronous more than Cluster 2. However, cluster 1 uses more asynchronous than the synchronous feature of their LMS. Conversely, cluster 2 uses more of the synchronous than the asynchronous feature of their LMS. The discriminant analysis function identified the synchronous and asynchronous levels significantly characterized between clusters 1 and 2. The result of this study suggests that the preference of the faculty to use more synchronous or asynchronous features of the LMS depends on the need of the course, which confirms two theories. Faculty that use the asynchronous feature of the LMS strengthen the Transactional Distance Theory. The asynchronous setting is more suitable for courses that require more critical and reflective thinking. On the other hand, faculty that preferred synchronous features of LMS support Cognitive Load Theory. These are courses that need immediate feedback, collaborative activities, and interaction. For more effective teaching and learning, the various programs in graduate school need to identify courses and activities that are more efficient in a synchronous or asynchronous setting.

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