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Leadership, Technology, Participation, and KM Appropriation: Enabling Knowledge Management for Developing Learning Materials in Online Tertiary Education

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***Abstract*—** The COVID-19 pandemic has caused significant changes in the Philippine educational system, leading to the sudden shift from face-to-face learning to online instruction. Despite the challenges, Filipino educators have embraced this new reality and are developing innovative strategies for online teaching and learning. This study explores the role of Knowledge Management (KM) processes and strategies in creating effective learning materials for tertiary-level online courses. The study focuses on the experiences of faculty members in the General Education department at National University Fairview, identifying four key themes that contributed to the successful implementation of KM strategies: leadership, technology, participation, and KM process appropriation. The findings have important implications for educators and administrators seeking to enhance the quality of online teaching and learning experiences in the Philippines and beyond.

***Keywords*—** higher education institutions, knowledge management practices, online class, qualitative study.

I. INTRODUCTION

The recent COVID-19 pandemic has drastically impacted the traditional teaching and learning environment, prompting educators to rapidly adapt to online teaching setups. This shift has posed several challenges for educators, particularly in developing appropriate course materials that are effective in an online learning environment. While educators have utilized various strategies to adapt to this change, the use of Knowledge Management (KM) processes and strategies in the development of course materials can provide a systematic approach to address this challenge. Knowledge Management (KM) has become an essential process in various fields, including education, where it is utilized to identify, create, disseminate, and utilize knowledge to achieve organizational goals and enhance overall performance (Alavi & Leidner, 2001). However, the recent pandemic has caused a significant shift in the traditional teaching and learning environment, prompting educators to rapidly adapt to online teaching setups. This shift has posed several challenges for educators, particularly in developing appropriate course materials that are effective in an online learning environment.

The use of KM processes and strategies in the development of course materials can provide a systematic approach to address this challenge (Chang & Huang, 2012). KM in education involves the identification, capture, sharing, and utilization of knowledge to improve the quality of education and enhance student learning outcomes (Alavi & Leidner, 2001). The utilization of KM practices can enable educators to create relevant, engaging, and effective course materials that are tailored to the needs of their students in an online environment. KM has been recognized as an important process for improving the quality of education by facilitating the creation, dissemination, and utilization of knowledge to achieve organizational goals (Alavi & Leidner, 2001; Chang & Huang, 2012). It involves the identification, capture, sharing, and utilization of knowledge to improve organizational performance (Alavi & Leidner, 2001). In the context of education, KM can be used to facilitate the development of appropriate course materials that can enhance student learning outcomes (Chang & Huang, 2012).

Given the importance of KM in education, this study aims to investigate the ways in which KM processes and strategies can support educators in innovating and developing learning materials for tertiary level education during the pandemic. Specifically, the study will focus on the experiences of faculty members in the General Education department, who were tasked with developing appropriate course materials for an online teaching setup. By exploring the collective experiences of these educators, the study aims to identify effective

KM practices and lessons learned that can inform future efforts to enhance online teaching and learning.

At National University Fairview (NU FV), the Remote Asynchronous/Synchronous Learning (RASL) approach has been implemented to facilitate the students' transition to a virtual learning environment despite the significant challenges. RASL operates under the Flexible Learning Experience (FLEX) method, which strives to deliver an affordable, quality education through digital and electronic means. This method involves a self-study, home-based learning system, with the learner's synchronous and asynchronous schedule evenly distributed across the week's meeting days. Course materials and deliverables are provided with flexible deadlines, and consultation sessions are available even outside synchronous classes.

Aside from delivering the lessons, teachers are also expected to create instructional materials that will support student learning even during offline sessions. However, most of the materials and activities used during face-to-face class are not appropriate for the virtual class, that's why the need to revise and/or create learning materials becomes imperative to all courses and programs. With the help of Knowledge Management (KM) techniques and strategies, NU FV faculty members and administrators were able to develop learning materials that are suitable for virtual class.

The objective of this study is to investigate the ways in which Knowledge Management processes and strategies can facilitate the innovation and development of learning materials for tertiary level education, particularly in the context of online teaching during the pandemic. Specifically, the study will explore the collective experiences of faculty members in the General Education department, with the goal of identifying effective practices and lessons learned that can inform future efforts to enhance online teaching and learning.

Materials Development and Materials Developers

In the Philippine education system, the responsibility of developing learning materials often falls on teachers, who are also tasked with delivering these materials to their students. Unlike in other countries where schools may have separate departments or offices for this purpose, teachers in the Philippines are expected to take on this added responsibility. According to Holguin and Morales (2014), this process benefits both learners and teachers, as it allows teachers to construct, reconstruct, and deconstruct theories based on their real-world experiences, which can then be put into practice in the classroom. As a result, students benefit from the knowledge and skills gained through these materials, which can positively impact their motivation and classroom experience (Harmer, 2002 as cited in Holguin and Morales, 2014).

Development of materials also promotes collaboration and communication between teachers and students, as it encourages teachers to listen to students' voices and take their needs and expectations into account when creating learning materials. Suba-i's (2010) research found that creating a supportive and friendly atmosphere for English as a Foreign Language (EFL) students requires identifying those with high anxiety and low self-esteem, while also considering their individual needs and interests. This underscores the importance of contextualizing materials to meet students' unique needs and interests.

In order to create effective learning materials, teachers must first determine the language level of their students and tailor materials to meet their emotional needs using topics that are relevant to their context (Tomlinson, 2003). Furthermore, teachers must also be aware of their students' social and cultural backgrounds in order to develop materials that are sensitive to their needs (Kumaravadivelu, 2007 as cited in Holguin and Morales, 2014). This process not only enhances teachers' theoretical and practical knowledge, but also allows them to improve their skills in designing balanced layouts, verifying sources, proofreading, and improving their language proficiency, among others. By taking a student-centered approach to materials development, teachers in the Philippines can empower their students and create a more engaging and effective learning environment.

Materials Development in Online Class

While developing materials is innately challenging, the demand to revise materials developed for courses is crucial since the transition from face-to-face classes is abrupt due to the pandemic. The unforeseen circumstances such as demands to use technology is one of the challenges that most (if not all) instructors need to face.

Since faced the fear of COVID-19 pandemic is still present, schools are forced to hold its classes online to

continue operate and serve its students. Without a guarantee of its affectivity and efficiency, the education system has to be flexible and while providing quality education to its learners. One of the ways to ensure that students are able to adjust and have its learning online, teaching and learning materials must be appropriate to its platform. Kristanto, et.al (2017) stated that few factors underlying the idea to develop a blended learning environment is the number of constraints that occurred in a learning process particularly the drain that students and teachers might experience during lectures hours. Hence, the importance of materials development in online classes is the idea to address it. The study proved that the development of blended learning instructional materials is considered advancement. It is also explained that in this model, teachers are not the only learning sources, but through this process, students will able to follow the learning activity that has been created in the blended learning model. In NU FV, where RASL is employed, learning material developers should also consider a collaborative learning with its students; and this transition (from face-to-face to virtual) is an opportunity to revisit traditional pedagogies to re-create a new one.

Based on Petroman's (2013) study, Open and Distance Learning (ODL) materials require adaptation and modification to create a comprehensive educational experience that promotes active and effective learning. Meanwhile, Cuesta (2010) emphasizes the importance of establishing a learning space that allows students to find a self-controlled scenario with the help of tutors and technicians. Thus, the design and development of online course materials are necessary tools that contribute to minimizing any difficulties that students may encounter in an online environment.

The design and development of online course materials not only minimize difficulties but also empower learners' abilities. The success of learners in the course and their satisfaction with the newly adopted learning mode rely significantly on the teachers' (material developers) contributions. Therefore, the creation of effective and engaging online course materials is crucial to ensure that learners receive a quality education, achieve learning objectives, and have a positive experience in the online learning environment.

Mulla et al. (2020) reported that the COVID-19 pandemic has prompted the Office of Faculty Development at Texas Tech University Health Sciences Center El Paso (TTUHSC EP) to rapidly transition to eLearning and faculty development. To prepare for this emergency shift, contingency plans were put in place to reformat face-to-face sessions for teaching, research, clinical skills/simulation, and leadership modules into eLearning solutions. The development of e-Learning materials and faculty development resources is becoming increasingly essential in today's digital world, especially during the COVID-19 pandemic, where telemedicine has become a necessity. These resources play a vital role in ensuring successful implementation of telemedicine and improving faculty members' competencies, as well as enhancing the quality of student learning outcomes. By creating learner-centered experiences that integrate evidence-based practices and efficient pedagogical approaches, e-Learning materials and faculty development resources can help faculty members support student self-regulation in e-Learning environments. Moreover, this process also involves considering the social, emotional, and psychological development of learners, promoting the acquisition of not just clinical knowledge and communication skills, but also professional behavior, compassion, empathy, and resilience. Faculty development in the eLearning environment can also facilitate the acquisition of new skills, roles, and highly interactive assignments. Therefore, developing e-Learning materials and faculty development resources is crucial for addressing the challenges of telemedicine and supporting the growth of faculty members and students in today's rapidly evolving digital world.

Mukhtar et al. (2020) demonstrated that the COVID-19 pandemic has forced educational institutions to close, leading to the development of online learning environments to ensure that learning is not disrupted. Consequently, many institutions have encouraged their members to deliver course content online in the face of the COVID-19 threat to ensure learner engagement and facilitate assessments without the need for physical classroom attendance.

The study highlighted the need for remote learning environments, and the implementation of online learning systems has helped institutions achieve their learning goals, despite the physical distance between students and instructors.

This model enables students and instructors to share course content remotely, allowing them to achieve the learning objectives of the course.

The Role of Knowledge Management in Education

According to Mohajan (2017), knowledge management plays a critical role in achieving sustainable development in organizations. This interdisciplinary field, spanning psychology, philosophy, and information science, offers tools and techniques that can enhance organizational effectiveness and provide a competitive advantage.

In the education sector, KM is equally important for developing systems that improve the quality and efficiency of education and research. Petrides and Nodine (2003) highlight the significance of KM in retaining the best professors and researchers, creating new curricula, and maximizing resources to meet student expectations anytime and anywhere.

To meet the demands of the twenty-first century, KM curriculum development and delivery must also support students' use of diverse platforms, applications, and mobile devices. Green (2011) identified four pillars of KM, including leadership, organization, learning, and technology, that provide a foundation for designing effective KM strategies and operations.

In the current health crisis, the development of learning materials that incorporate KM tools and techniques presents both an opportunity and a challenge for the education sector. As such, it is imperative that the sector embraces the potential of KM to enhance teaching and learning and facilitate sustainable development.

II. RESEARCH METHODS

The study will use a qualitative research design, specifically a case study approach, to explore the ways in which Knowledge Management (KM) processes and strategies can support educators in innovating and developing learning materials for tertiary level education during the pandemic. A case study design is appropriate for this study as it allows for an in-depth exploration of a specific phenomenon, such as the experiences of educators in the General Education department in developing course materials for an online teaching setup (Baxter & Jack, 2008).

The participants in this study will be faculty members from the General Education department at a tertiary level institution who have experience developing course materials for an online teaching setup during the pandemic. A purposive sampling technique will be used to select participants who have a range of experiences and perspectives related to KM processes and strategies in the development of course materials.

Data will be collected through semi-structured interviews with the selected participants. The interviews will be conducted online via video conferencing software, such as Zoom or Skype, and will be audio recorded with participants' consent. The interview questions will be developed based on the research objectives and will focus on exploring the participants' experiences and perspectives related to KM processes and strategies in developing course materials for an online teaching setup. The data collected from the interviews will be analyzed using thematic analysis. Thematic analysis is a qualitative data analysis method that involves identifying patterns or themes in the data through a process of coding and categorizing (Braun & Clarke, 2006). The analysis will involve several stages, including familiarization with the data, coding, categorizing, and interpreting the data to identify common themes and patterns related to KM processes and strategies in the development of course materials for an online teaching setup. This study will adhere to ethical principles and guidelines outlined in the Belmont Report, including informed consent, confidentiality, and protection of participants' privacy. Participants will be informed of the study's purpose, procedures, and their rights as participants, and their consent will be obtained before the interviews are conducted. All data will be kept confidential and anonymous, and identifying information will be removed from the data before analysis.

III. RESULTS AND DISCUSSION

The process of introducing a strategy to develop student learning materials amidst of pandemic is challenging; but because of leaders that are eager to incorporate this approach to the organization, it became manageable. For NU FV, the General Education's department chair initiated it. As shared in an interview, they were

instructed to develop materials that are appropriate for the programs offered by the campus pertinent to its course in preparation for the online classes. This may seem simple but the process is rigorous considering that physical interaction is limited due to the pandemic. This led the management to maximize the use of the Learning Management System by the university which is the Microsoft Teams (MS Teams). They found out the features that are helpful for collaboration, and brainstorming which serves as crucial tools in materials development. From this, they strategize the process and

approach that will be used in the said purpose and commenced the initial stage of the process – Building awareness about the strategy among the faculty members.

Figure 1 presents the Knowledge Management (KM) process employed for materials development in Phase 1. The KM process started with building awareness about the strategy for developing materials for online classes as instructed by the head office. At this stage, the Program Chair was responsible for disseminating information about the strategy to their respective faculty members. The Program Chair was also trained on the features of MS Teams that were expected to be utilized during collaborations and brainstorming. In building awareness, the faculty members were informed about the objectives of the knowledge management process and strategies to be employed in developing course materials. This stage also involved identifying the relevant stakeholders, including the faculty members, department chairs, program chairs, and management.

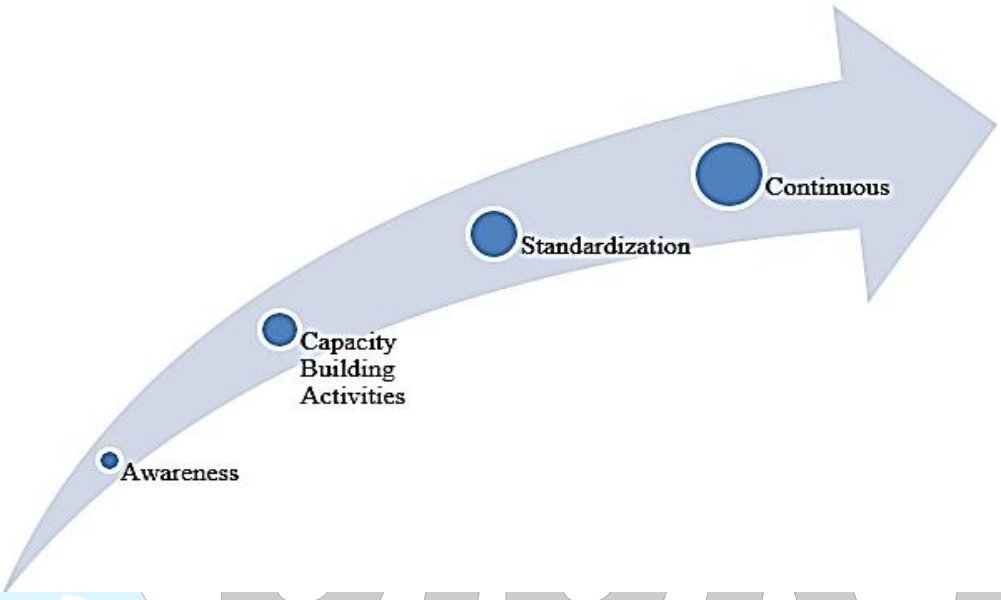

Figure 1. *KM Process Employed for Materials Development – Phase 1*

The identified stakeholders were informed about the expected roles and responsibilities, as well as the timeline for the material development process. Moreover, the faculty members were provided with training and support in the use of MS Teams. This stage involved introducing the features and functionalities of MS Teams relevant to the material development process. The faculty members were also given guidelines and best practices for effective collaboration and brainstorming. This stage aimed to ensure that the faculty members were equipped with the necessary knowledge and skills to effectively utilize MS Teams in the material development process. Several studies have emphasized the importance of building awareness and providing training and support in knowledge management processes and strategies (e.g., Tsui, 2005; Al-Shehri & Al-Harbi, 2014). By starting the KM process with building awareness and training, the faculty members were able to understand the objectives and strategies of the material development process, as well as acquire the necessary skills to effectively utilize MS Teams.

After identifying the suitable teachers for collaborations, the Program Chairs announced the decision through a faculty meeting or training while classes were still on break. During this time, the teachers underwent training and seminars on materials development and technology management to enhance their skills in creating materials that are appropriate for the online learning setup. The trainings aimed to complement the available technology provided by the university, specifically the features of MS Teams that are expected to be utilized during collaborations and brainstorming.

The third stage of the KM process was to standardize the process used by teachers in developing the learning materials. This ensured that the organization had a common understanding of how the materials were created and evaluated the process for future improvements. This standardization provided the knowledge workers, or the teachers, a better understanding and appreciation of their capacities as well as facilitating an easier evaluation of the process itself in the future.

The last stage was to continuously employ these processes to create a lasting impact among the NU faculty members on how to develop student learning materials for both face-to-face and virtual classes. This would ensure that the KM strategies and processes would become part of the organization's culture and be consistently used even after the pandemic. By doing so, the organization could improve its learning materials development process and enhance the quality of education for its students.

In Phase 2, NU FV employed a strategic framework for the actual development of learning materials. Figure 2 showed the cycle on how to acquire, evaluate, share, and apply the developed student learning materials. The process started with retrieving or collecting the existing manuals, learning materials, and course activities that had been used in both face-to-face and virtual classes. Printed documents were converted to digital format so that they could be uploaded to the Cloud-based software used by the university - Microsoft One Drive.

The review process included the categorization of materials according to the course and program. For example, engineering programs with Math in the Modern World courses have different materials and set activities compared to arts programs. Reviewing and categorizing previous materials was important to ensure that they would reflect the needs and nature of the programs. At this stage, the materials developers (teachers) were required to evaluate the appropriateness of the materials. After carefully reviewing the content, the teachers assigned to the course were in charge of revising or creating new materials based on the collected data and tailored to their assigned course. Since the materials were kept in a shared folder, it was easier for them to access the materials.

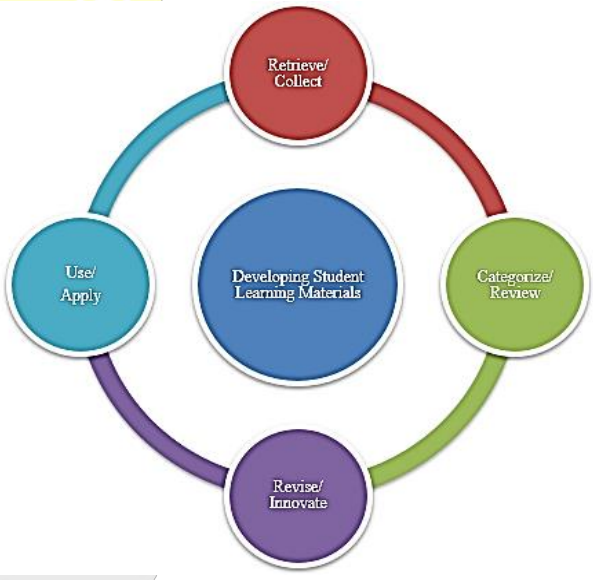

Figure 2. *NU FV's Knowledge Management Strategy for Materials Development – Phase 2*

Finally, the revised or newly-developed learning materials could be used and distributed as a student's course material. These materials could be in the form of a lecture summary, series of offline activities, video lectures, or PowerPoint presentations that could be used during online class discussions.

This strategic framework allowed NU FV to ensure the quality and appropriateness of the learning materials, regardless of whether the classes were conducted face-to-face or online.

IV. CONCLUSION

The implementation of Knowledge Management in materials development for online classes involves several significant elements that were identified in the study. The first is leadership, which involves the openness of leaders to incorporate a strategy that utilizes the existing knowledge in the organization. This is important in successfully accomplishing the task of developing learning materials for online classes. Leaders or KM champions initiate the planning and implementation of KM strategies and processes, which

helps teachers (as materials developers) maximize the resources available and create innovative learning materials for online classes.

The second element is the role of technology. In the context of the pandemic, technology plays a crucial role in providing support for communication and collaboration. Microsoft Teams' applications and Microsoft One Drive were used to encourage collaboration among materials developers, making it easier to access and retrieve resources. Teachers with the same courses to teach were also encouraged to collaborate with one another to incorporate new ideas and creative activities through chat and video conferencing.

The third element is the participation of people. The success of any program or project relies on the willingness and participation of its members. In NU FV, faculty members actively participated in capacity-building activities such as webinars and forums about materials development, basic video and audio editing, teaching and learning strategies, and the use of free applications from MS Teams. They appreciated a systematic process in accomplishing the task, despite working together physically

The fourth element is the appropriate process. The frameworks provided by the leaders helped make developing learning materials much easier. Instructions and communication commands were provided well in the process, which made everyone involved well-guided. This highlights the importance of employing an appropriate process and strategy.

In conclusion, the use of Knowledge Management tools and techniques helped NU FV design strategies and processes to successfully innovate and develop learning materials for online classes. It benefited both material developers (teachers) and administrators in accomplishing a task using the knowledge existing in the organization. The incorporation of KM to accomplish the task in materials development assisted the organization in achieving its purpose. By properly managing knowledge, organizations can achieve their goals and objectives more efficiently and effectively.

V. RECOMMENDATIONS

Based on the findings of this study, it is recommended that academic institutions should consider incorporating Knowledge Management strategies and tools in developing learning materials for online classes. The study showed that by employing a systematic approach and utilizing the knowledge existing within the organization, it is possible to create innovative and effective learning materials that meet the needs of students and achieve the objectives of the institution.

Leadership plays a crucial role in the success of implementing Knowledge Management in materials development. Therefore, it is important for leaders in academic institutions to be open and willing to adopt a strategy that utilizes the knowledge existing within the organization. They should also take the responsibility of initiating steps in planning and implementing KM to ensure that the process is well-guided and effective.

Technology is also a vital component in the implementation of Knowledge Management in materials development for online classes. The use of Cloud-based software and collaboration tools such as Microsoft One Drive and Microsoft Teams can facilitate the sharing of resources and encourage collaboration among materials developers. Therefore, academic institutions should ensure that their teachers have access to these tools and encourage their use.

The participation and willingness of faculty members to actively cooperate and engage in the program is also an essential element. Institutions should provide capacity-building activities such as webinars and forums about materials development, basic video and audio editing, teaching and learning strategies, and the use of free applications from MS Teams. This will ensure that faculty members are equipped with the necessary skills to effectively develop learning materials.

Finally, employing an appropriate process and strategy is critical to the success of Knowledge Management in materials development. Academic institutions should provide a systematic process that is well-guided with clear instructions and communication commands. This will ensure that everyone involved is well-informed and well-guided in accomplishing the task.

Therefore, this study provides valuable insights into the implementation of Knowledge Management in materials development for online classes. The findings suggest that by employing a systematic approach, utilizing technology, encouraging participation, and employing an appropriate process and strategy, academic institutions can successfully innovate and develop effective learning materials for online classes.

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