

Investigating the Employees' Perspectives and Experiences of Microlearning Content Design for Online Training

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Abstract—Online training is expected to increase retention of information and be less time-consuming. This leads to a motivation to identify a more effective content delivery for online training. Microlearning indicates that bite-sized content is delivered in short fragments that can fit into anyone's hectic schedule. However, the perspective of microlearning and its content design is still indefinite. It is challenging to design content for training that optimizes microlearning's characteristics. The purpose of this research is to identify the perspective towards microlearning and the significance of the design of micro-sized content for online training for employees. This study investigated two questions which are how to design an effective micro-sized content for enhancing employees learning opportunities and the type of topics which are relevant to learning. The study was carried out with employees from education industries and training service providers. Data was collected through a survey and focus group interview. The study recognised that employees are primarily familiar only with video-based microlearning content and they have inadequate knowledge on the application of other microlearning elements for content design. One of the most common microlearning elements – Video, that is between 5-7 minutes in length, is considered to be the most applicable element in microlearning. In conclusion, the perspectives concerning the challenges in designing microlearning content were discussed. The study also proposed 2 different architectures with different objectives for the overall microlearning content design based on the employee's experiences and perspective.

Index Terms—Microlearning, micro-sized content, online training, content design.

I. INTRODUCTION

Today's learners are digital natives. The emergence and evolutions in technology have brought many changes in the work industry. Time poses a huge constraint as careers get busier. Online training is fast becoming the best and most convenient way to learn and keep skills updated on the job continuously. Organizations are deemed to use various learning techniques and approaches that permit employees to be functional participants with strong motivation and engagement. However, employees are facing challenges in the adoption and engagement of online training as they have various needs, learning styles, preferences, and requirements for learning [1]. Employees are looking into more flexible learning that specifically targets the need for quick and

fast-paced learning while at work [2]. Various approaches such as Instructor-led training, hands-on training, simulation employee training, and E-learning have been introduced to understand and improve the employee's ability to acquire skills and learning in the workplace [3]. Yet, the most challenging task for the organization is to devise coherent techniques to train the employees that are responsible for bringing positive, growing, and healthy change to the organization and its environment [4]. It is vital for organizations to ensure that employees can demonstrate a positive training impact through improved productivity and overall skill development. With the rapid growth, organizations are keen on identifying reliable methods to measure the training effectiveness for continual learning and development of such employee training initiatives [5]. Therefore, many organizations have shifted to knowledge possession in the workplace by engaging and motivating employees through short and just-in-time learning called microlearning.

Microlearning offers bite-sized learning content that best fits the online training resources which can be tailored to quick, convenient, and topic-centered for employees [6]. Microlearning in online training will enable the employees to bridge the gap of time constraints and allow knowledge expansion to continuously improve their job skills [7]. However, microlearning's elements and characteristics are still vague to many employees. Thus, the application of microlearning is still inadequate. It is important to understand the real definition and relevancy of microlearning and its ability to provide knowledge-based content for online training. Microlearning content can help enhance the learning ability if it's designed the right way. Therefore, the study was initiated with two assumptions that firstly, micro-sized content can be an independent content that carries information and deliver meaningful knowledge and also content that provides technical knowledge can be better designed with relevant supporting approaches and delivered as micro-sized content. The study aims to answer the following 2 questions a) What kind of topics are relevant for the employees to learn through micro-sized content? b) How to design effective micro-sized content to increase employees learning opportunities? Therefore, a research study was conducted with employees from various education industries and training service providers to draw out the implications and insights to design the microlearning content.

To summarize, training for employees faces various challenges, especially during the Covid-19 pandemic. It is crucial to continue to learn for employees in an organization

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when time is seen as the biggest constraint. In an organization, employee development is recognized as the most important mechanism to measure the organization's continuous growth, productivity, and also ability to retain valuable employees. Employee development programs will be affected if the organization neglects the challenges faced by its employees. Therefore, it is important to recognize and cater to the employee's training needs. With microlearning's booming popularity as a learner-centric approach and its ability to complement other digital learning characteristics, the employees are expected to have a greater learning experience.

II. RELATED WORKS

A. Online Training

Online training is raving up in most organizations as it brings many advantages to both the employee and the organization compared to conventional training. Conventional training often uses longer training sessions, which cause learners to become disinterested and distracted easily and ultimately become a barrier to learning. Relatively, online training is the counterpart of the conventional training model, which carries an unconventional type of learning. Online training actively elicits learners in building new knowledge through the vast availability of online resources. Online training is also booming due to its flexibility to tailor every employee's needs and also helps in employee retention. Some of the main perspectives of online training include convenience, cost-effectiveness, continuous improvement of skills and knowledge, and better opportunity to access the contents from anywhere [8].

Nonetheless, there are other hindering factors of online training among employees as it possesses certain challenges such as self-motivation, engagement, time flexibility, and many others. To measure one's engagement or adaption is never easy. Periodical growth and evaluating the employee and getting feedback will be harder or even negligible. Recently, online training, which includes web-based learning, video-based learning and etc., emphasized techniques like Hybrid Learning, Adaptive and Self-Directed Learning strategies [9]. However, providing online training which is content-based and expecting the employee to upskill knowledge is inefficient. Employees have different expectations towards online training. Therefore, it is crucial to first identify the perspectives or expectations of employees towards online training. In a study to investigate the perceptions and attitudes of employees towards online training, it is indicated that employees prefer a blended learning model. [10] This is due to its characteristics of being able to accommodate both learners who prefer conventional training and online training which is convenient.

Research on employees' perspectives towards online training conducted in their organization during the pandemic surprisingly revealed that they find the online training mode is insufficient to impart knowledge. They would prefer a more efficient approach or pedagogy for knowledge and skill development [11]. Employees perceived that they required something to retain their attention span. They want to be able

to learn at a short period, boost their motivation and keep them engaged throughout the training. Therefore, learners are expecting knowledge acquisition in a short duration. In a research to identify the drive that contributes to the satisfaction and implication of online training, it is prudent that the social and motivational factors play a key role in learning through online training [12]. It is also mentioned that designing learning content that captures the interest of a learner is paramount to success in online training. The content has to cater to various requirements of the employees. However, the choice of the right content and the design of the content is still vaguely explored in many online trainings. It is concluded that online training has to be delivered with better learning content that is easily accessible and flexible. Therefore, microlearning is expected to be the best fit for this phenomenon as it offers various benefits such as short period of time, focuses on specific concept and increase learner's participation if it is used appropriately.

B. Microlearning Element and Content Design

Microlearning can be expressed as the use of micro-sized content for learning. It is mainly referred to a small or compact topic-based content that can be learned in a short span [13]. Microlearning can be extended across technologies and social media in addition to conventional learning management systems [14]. There are various microlearning elements such as static resources - mini-lectures using videos, text, images, and audio. Other elements include podcast, social media, Infographics, gamification and etc.

In this 'Google' era of searching for microlearning content for online training, there are many resources readily available. The process of skimming through the content from various internet resources requires the ability to identify the microlearning elements used in content design. There are contents which uses single element or multiple elements [15]. A framework consisting of multiple elements of microlearning was developed for a hospital employee online training. The framework is to facilitate the design and deliver microlearning content using multiple microlearning elements such as video, audio, and text elements. The research did not explore the other elements [16]. In another research on micro-learning content integration for e-learning platforms, it is highlighted that the most commonly used element is the audio-visual format which can be digested widely among the employees [17]. Learning ability such as engagement and knowledge retention can be improved with the utilization of microlearning element in content design. The usage of video element to design the content for each topic inferred that using microlearning could improvise a learner's ability to learn by up to 18% increase over conventional types of training [18]. This is mostly achieved by implementing the common microlearning element which is the video element followed by static resources such as text and images. The elements are put together into a content for about 10 minutes in duration to develop a microlearning resourceful content [19].

In addition to the literature review on previous work done, Table I depicts the microlearning elements commonly applied by various researchers. As shown, most studies focus

on audio, video and static resources such as text and images. The utilization of other elements, such as simulations, infographics, podcast and gamification, are still lacking. This could be due to the inadequate knowledge of microlearning and its elements for content design.

TABLE I: MICROLEARNING ELEMENTS COMMONLY APPLIED BY VARIOUS RESEARCHERS

Microlearning elements	Diaz <i>et al.</i> (2020)	Reynolds <i>et al.</i> (2019)	Chong <i>et al.</i> (2020)	Lynn <i>et al.</i> (2018)	Lin <i>et al.</i> (2019)
Audio/ video	x	x	x	x	x
Simulations					
Infographics					
Gamification					
Static Resources		x		x	x

C. Perspective towards Microlearning and Content Design

Despite the bloom of microlearning, little has been known about the proper definition of microlearning and how to design micro-sized content relevant for employees training. The current review of the existing literature on microlearning perspectives specify that very minimal research studies have been administered in recognizing the learner's perspective towards microlearning element for content design [20]. The learner's response towards the microlearning content and non-microlearning content indicated that they prefer the microlearning content over other e-learning content as the microlearning content element seems to increase engagement and motivation among learners [21].

As for the perspectives and implications towards microlearning content design, it is indicated that the video element is perceived as the optimum element for content design [22]. Video element for content design seems to be preferred by learners as it enhances employee retention due to the micro-sized learning characteristics such as improving knowledge retention, making learning more engaging and flexible. Flexibility in learning is another challenge perceived by most learners. The challenges perceived by learners are mostly in understanding the content but with microlearning content design, learning is leveraged [23].

Although microlearning content provides new ways of learning that help in building retention of the information, it is important to underline that microlearning is not only for information dissemination but could also be used as an effective knowledge transfer tool [24]. The content design that dispenses knowledge rather than just giving information is preferred by most learners. There are topics that can be designed using microlearning just for informative purposes and knowledge purposes. Learners mostly prefer the content design which is knowledge-centric. However, the extensive knowledge on the application of using microlearning and its various elements for content design is still lacking. Therefore, this call for more empirical research that unlocks the perspective towards microlearning and its content design.

In conclusion, online training, microlearning elements, and the learner's perspectives towards microlearning content design have been discussed in this section. However, there is a need to understand the microlearning definition from the learner's perspective for content design. This is to further

explore and enhance the application of microlearning in online training. The focus group interview method will be used to investigate the types of microlearning relevant topics for micro-sized content design. From the past research done, microlearning is only seen as a tool to convey information and not knowledge. It is important to highlight that microlearning can bring many other benefits to the learners if it is being used in the right way. Microlearning best practices can help facilitate knowledge as well as transfer knowledge. The importance to identify the characteristics and elements of microlearning that can aid knowledge acquisition in online training is aimed to be solved by using the survey method. The survey is also expected to identify the various microlearning topics that are necessary to be included in online training.

III. METHODOLOGY

A. Research Participant

The conception of microlearning is interpreted as learning with micro-sized content that can be adopted by employees in a non-formal or informal learning expanse, and the ability to convey knowledge or information in a crisp form through several types of elements. A total of 190 participants of this study were employees from a private university and a leading training service provider in Malaysia. These employees have the role of both trainer and trainee. As a trainee, they have attended prior training provided by their respective organization. They become trainers when they are required to provide training to external parties outside their organization. These participants are mostly with a degree or master's qualification. Relatively, they are considered to hold high levels of expert knowledge in their areas relevant to their qualification. To identify their experiences on online training and perspectives concerning microlearning, data was collected through the survey and focus group interviews. Only responses from participants who have attended any prior online training will be considered as the sample for data analysis.

B. Survey

The survey method was carried out to collect data on microlearning. Data were collected in October 2021 via Google form. The online survey was distributed to the employees of a private university and a leading training service provider in Malaysia. A total of 190 employees/participants completed the online survey. However, to ensure the relevancy and validity of data, the data analysis was only carried out on the responses from employees who had already completed at least one online training provided by their organization. This is to ensure data relevancy is achieved. There were about 150 valid responses. The responses were then analyzed by descriptive statistics to identify overall results pertaining to microlearning.

The online survey consists of 13 closed-ended questions which comprise questions about perspectives and knowledge on microlearning. Some of the questions are: what is microlearning to you? which are the most beneficial characteristics of microlearning? which element of microlearning you would prefer and, what is contemplated as

the ideal length of microlearning content? These questions were aimed to understand the participant’s perspective towards microlearning.

C. Focus Group Interview

The Focus Group Interview (FGI) was conducted to have an in-depth perspective of microlearning content design. This is to facilitate knowledge in designing the appropriate microlearning content, mainly from the content design perspectives. The participants for the FGI were selected from the 150 valid responses. The criteria to be the participant of the FGI was anyone who has a master’s or Ph.D. level of education and has attended more than 2 online training. This requirement was implied to ensure the participants are experts from their field of knowledge relevant to their qualifications. Based on the valid responses, 121 participants are mostly educators and trainers with master’s and Ph.D. level of education and has attended more than 2 training. As the focus group needs a niche target, 13 participants (9 males and 4 females) were selected randomly based on their availability and willingness to participate in the interview. The FGI was conducted for 40 minutes each in two different sessions via Google meet. The participants were dissected into two groups. Group A consists of 6 participants and group B consists of 7 participants. The participants were dissected into two groups mainly because focus group interview only encourages 4 to 8 participants in a group. The interview was conducted with semi-structured questions that focus on the demand for the application of microlearning content design and suitable topics of knowledge for micro-sized content design. The 2 most important questions asked during the interview was on the topics that the participants would like to learn through microlearning and if there are any other approaches that they would like to embed with the microlearning content. The FGI was transcribed and the content-analysis method was applied to analyze data to identify comprehensive responses. Both group A and group B were asked the same type of questions. The similar responses were categorized and then grouped into common themes. The data was then analyzed based on the common ground sharing of information and knowledge towards microlearning.

IV. RESULTS

A. Survey

Amidst the 150 respondents who submitted valid responses, 121 respondents acknowledged that they had prior experiences with microlearning contents. The primary question asked was to understand the commonly known microlearning element. This question only contained 6 microlearning elements as options to choose from. As shown in Fig. 1, the Video element (38%) was recognized to be the most popular element of microlearning, followed by 25% in Static text, and 14% in Infographics. The least popular was the Podcast element. It is evident based on the related work by other researchers that only video and static text is vastly used due to its easily extracted availability from any resources. However, the study was aimed at identifying other

microlearning elements that can be explored further as well. The study shows that the Infographics and Gamification element’s existence is known but not extensively applied. There is a need to identify the characteristics of the Infographics and Gamification element and how they can be used in content design.

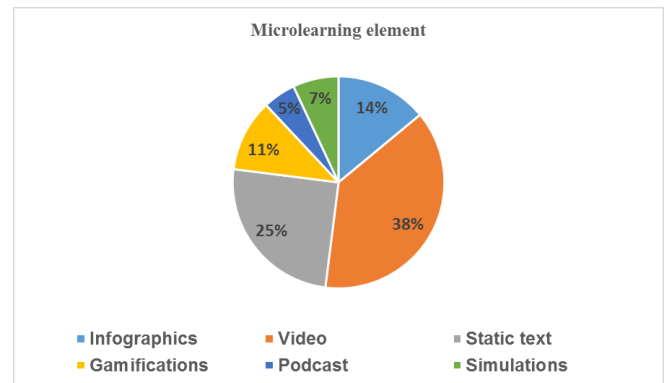


Fig. 1. Common microlearning element.

The next question was to identify the ideal length of micro-sized content for microlearning, as shown in Fig. 2. The participant of the survey perceived that the content which is between 5-7 minutes in length (40%) is the most ideal for microlearning, followed 7-10 minutes (25%) and 3-5 minutes (19%). The data also indicates that the participant was least interested in shorter content which is approximately about anything lesser than 3 minutes.

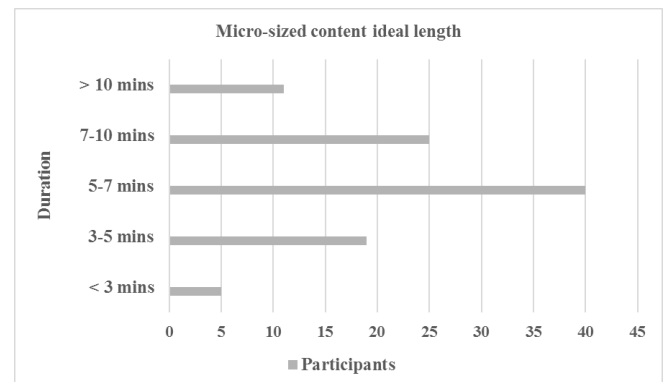


Fig. 2. Ideal length of micro-sized content.

TABLE II: RANKING ORDER OF MICROLEARNING TOPICS

Rank	Topic	Percentage
1	Teaching and learning	21 %
2	Teaching effectiveness	16 %
3	Development of learning materials	14 %
4	Interactive learning	13 %
5	Engagement techniques	12 %
6	Soft skills development	7 %
7	Ethics and principles	6 %
8	Teamwork	5 %
9	Presentation skills	4 %
10	Written and verbal skills	2 %

The results have demonstrated the common element of microlearning and the ideal length of content based on the participant’s perspective. There was also a question asked to analyze the kind of topics that the participants find most compelling and relevant to microlearning. This is because the

participants are adult learners who may have various learning requirements and it is essential to match the learning requirements with the contents accordingly [25]. Table II depicts the ranking order of microlearning topics. This question was designed with only 10 options. As the participants are required to upskill their knowledge to be better educators and trainers, the topics covered are only revolving around the area of teaching and learning. The survey data indicates that participants recognize the microlearning topics which concern the areas of teaching and learning (21%), teaching effectiveness (16%), development of learning materials (14%), and other topics related to teaching and learning. It is because they find it to be advantageous to their career as well as to enhance their interpersonal skills. The participants are less interested in topics that are related to general work conduct-related topics such as ethical and principles topics.

Microlearning is recognized as a tool to deliver learning content. It is important to identify the microlearning characteristics that make microlearning implementation compelling. This is to understand the participant’s perspectives towards the characteristics of microlearning and how microlearning is seen as effective for them. As shown in Table III, the participants regarded ‘short duration’ (32%) as the most advantageous characteristic of microlearning, followed by focused (23%), independent (19%), interactive (15%), and responsive (11%).

This finding indicates that from the content design perspective, microlearning is seen as beneficial mainly for its efficiency in retrieving content quickly, in addition to the practical and diversity in supporting the on-demand content acquisition.

TABLE III: RANKING ORDER OF MICROLEARNING CHARACTERISTICS

Rank	Characteristics of microlearning	Percentage
1	Short duration	32 %
2	Focused	23 %
3	Independent	19 %
4	Interactive	15 %
5	Responsive	11 %

B. Focus Group Interview (FGI)

The Focus Group Interview (FGI) session was aimed at obtaining various in-depth perspectives of the participants towards microlearning content design. In the past, researchers have concluded that adult learners have various perspectives towards learning through microlearning [26]. Therefore, it is paramount to identify the perspectives of each participant towards microlearning to facilitate the content design. The session started off with a general conversation pertaining to the definition of microlearning according to the participant’s view. This was mainly to initiate a common ground understanding of the definition to ease the discussion session. The discussion indicated that most participants were not completely familiar with the term microlearning. They couldn’t clearly define microlearning or differentiate from other e-learning terms. 54% of participants define microlearning as small learning units, 32% define it as short-term learning and 14% define it as quick learning.

Whilst all of these definitions may seem relevant, there is a need for redefining microlearning from the content design point of view as well.

The FGI session also discussed the needs and demands for new and constantly updated microlearning content that is related to training and development. The participants, who are also trainers themselves, desired the need for a specific hub or portal to ease access and retrieve any microlearning content which can be used to enhance their training and development skills. They also expressed that the platform should be catered for both the trainers and trainees to enhance their skills and also available for external parties’ training.

Another concerning area was a lack of knowledge on creating micro-sized content with an assessment component to enhance learning retention. The microlearning topics should be new, in the trend or a topic that is currently in demand, and paired with an assessment approach that can motivate learning. The participants want to learn with engagement and the feel of accomplishment. The participants indicated that integration of microlearning with other learning approaches that can elevate retention would be more beneficial. The goal is to maximize engagement by capturing the interest of learners and inspiring them to continue learning. The participants discern that microlearning content can be complemented to deliver the fundamental concepts and knowledge of any skills and development-related training. However, there must be a factor to motivate the learners to continuously engage themselves. The participants indicated that a fun method or approach should be integrated to keep the adult learners on-going. The participants anticipate that learners will learn better in gamified content integrated with microlearning.

Microlearning content can also be altered to gamified content by incorporating challenging elements. There are many elements of gamification such as level, badges, points, and flags. One of the popular elements is points [27]. Point-based gamified content versus minutes of learning is expected to enhance learning motivation among employees compared to learning with a specific duration [28]. In the interview, the participants were asked on which other training approach they would like to embed with microlearning content. As shown in Fig. 3, the other content integration approaches, 35% of the participants responded that game-based content is the most expected as it encourages learning and promotes retention followed by 28% responding on personalized content. The least expected is the Inquiry-based training content which is about 8%.

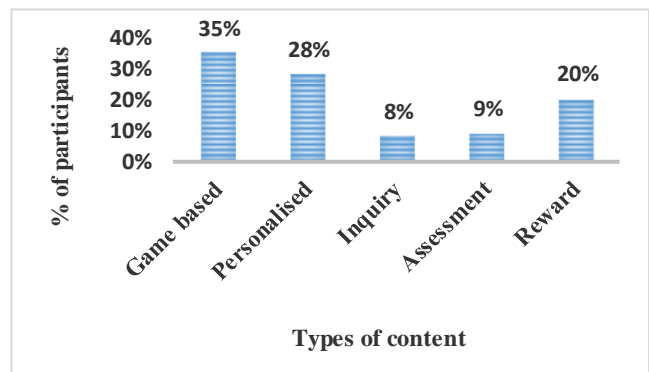


Fig. 3. Other content integration approach.

V. DISCUSSION

The perspectives and perceptions of participants have been examined through the Survey and Focus Group Interview methods. One of the key findings was that there is no common or uniform definition of microlearning from the participant's view. The participants interpret anything to be microlearning if it allots with the streamlined information in the proportion of content that can be ingested in a short duration. Another finding indicates that there are different conceptions on the topical areas that are perceived to have the relevancy for microlearning. To design a micro-sized content, the duration, relevancy and the newness of microlearning are some of the critical factors. It is suggested that for framework development, microlearning content is identified based on the microlearning characteristics and then to deliver the content accordingly.

According to the participants, apart from learning, knowledge retention is a crucial factor that needs to be addressed as well. Microlearning is expected to deliver knowledge and not just information. Therefore, the topic for content design needs to be carefully selected to ensure knowledge acquisition relevant to their work demand. To intensify the knowledge possession, the participants specify their desire for any approach that can be integrated with microlearning to enhance and boost motivation while learning. Most participants designated game-based content as an integration approach. Game-based content with micro-sized content can be used to explore knowledge interactively if the right content gamified technique is adopted for content design [29]. Therefore, 2 different architectures namely Dual Architecture and The Integration Domain Architecture are proposed. Dual architecture is to provide topics that can be learned through any microlearning content with stipulated duration or gamified content with no restriction on duration. The Integration Domain architecture is to integrate learning and evaluation. Every topic learned will then be assessed with any gamification technique from the evaluation domain. This will ensure the learner has learned the desired topic and achieved the needed skills and development.

A. Proposed Dual Architecture

Fig. 4 depicts the proposed dual architecture that indicates the microlearning content and gamified content. The purpose of this architecture is to imply the idea that microlearning means learning through a short duration which is within 5-7 minutes. Any microlearning content that falls within the 5-7 minutes' category will be extracted and delivered via Path 1 and any gamified content with no time restrictions will be delivered via Path 2. Gamified content with no time restrictions indicates that the topic will be delivered in a game-based content. The purpose of gamified content is to promote learning for learners who are alienated by just video-based knowledge [30]. For example, a topic of learning can be designed into a puzzle game. Upon completion of the puzzle successfully, the learner is considered having learnt the topic. Subsequently, it supports the on-demand and on-the-go adoption of microlearning and easily accessible for anytime anywhere concept. The learner will be able to choose the path for knowledge acquisition. In

a previous study to facilitate content selection, a similar framework was developed to recommend the learning materials or content to the learners through a self-directed system [31].

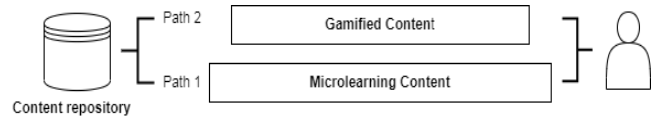


Fig. 4. Dual architecture for the overall content development.

B. Proposed Microlearning and Gamification Integration Domain

The participants indicated that along with learning, evaluation based mechanism will be preferable. This mechanism is expected to test the knowledge of learners after completion of learning content or while in the learning process. This gamification domain will act as an evaluation mechanism for knowledge acquisition. A similar study on the effects of integrating gamification for employee retention indicated that employees in the gamified group showed better progress and increased motivation to learn compared to the non-gamified group [32]. This gamification component is expected to improve knowledge retention and boost motivation in the learning process. Therefore, the study proposed an integration domain consisting of the learning domain and evaluation domain.

As shown in Fig. 5, the learning and evaluation process is being integrated. The learning domain consists of skills and development related topics. Some of the topic includes learning effectiveness, interactive training, and engagement techniques. The content of these topics is constantly updated according to the learners' demands.

The evaluation domain consists of assessment-related content. The evaluation domain is aimed to measure the training effectiveness and to evaluate the learner's knowledge upon completion of any microlearning topic from the learning domain. This domain is suggested to act as a mechanism to measure the content effectiveness delivered to each learner according to their preferences and needs.

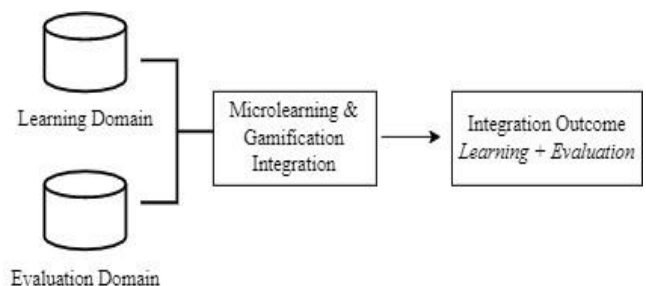


Fig. 5. Proposed Microlearning and Gamification Integration domain.

VI. FUTURE WORK

One of the primary findings of the proposed study is the various definition of what confines microlearning and specifying the semantics and theory of knowledge. The participant indicated that they want a strong knowledge acquiring topic that benefits them rather than just an informative topic. The learner needs to feel that he or she has learnt. The proposed study could not measure how each

content can be distinguished as an informative topic or knowledgeable topic. So, whether the micro-sized content designed for microlearning disseminates information or knowledge is another arguable issue that is worth paying attention to. This is important to be identified as every training and development's objective is to provide knowledge and not just information.

The nature of content delivered via microlearning is likely to be dynamic, topical and interest-driven. Therefore, the structure for designing microlearning content needs to be aligned with the trend. It is vital to develop a mechanism to rapidly generate and disseminate micro-sized content according to each individual [33]. This will improve the adoption of microlearning content as it is designed and catered to meet each individual's needs. Hence, a personalized intersectional model to generate, disseminate and recommend micro-sized content resources may be a more supportable model for microlearning [34]. The bloom of microlearning has been witnessed and video content seems to be on the rise. However, the other elements of microlearning can be further investigated in terms of application for microlearning content design.

VII. LIMITATIONS

The proposed study is not generalized or made applicable to all adult learners as they have various characteristics and may fall into various categories. Adult learners are derived from different backgrounds. They differ in many aspects, for example, the level of education, the area of expertise and the years of experience. There is a need to channel all these differences and to design a method to cater for each of these characteristics accordingly. Lack of statistical comparison is the other limitation in the proposed study. It would have been more useful to analyze further the responses from the survey via comparisons of a more discrete group. The study could not explore inferential statistical analyses due to the anonymous survey and also there is lacking of demographic data. The proposed study only focused on a specific group, hence the data analysis could not have been widely carried out. However, despite the above-mentioned limitations, it is believed that the proposed study has addressed and provided the important implications and perceptions towards the understanding of microlearning contents and suggestions on the future research work has also been presented.

VIII. CONCLUSION

As organizations strive to engage employees to upskill their knowledge while at work, the solution to acquire knowledge is through training. Online training paired with microlearning best fits the current needs of employee employees' various preferences. Microlearning which promotes accessibility and flexibility is ideal for online training and learning process. However, the application of microlearning concepts is inadequate as there is a lack of understanding of the overall microlearning definition and its implementation for content design. Eventually, this leads to

insufficient utilization of the microlearning elements as well. The proposed study has identified the commonly used microlearning element and the characteristics of microlearning to aid in content design for online training. Related works on microlearning and its content design have been discussed and it is prudent that employees have various perspective and needs towards microlearning. It has also been concluded that employees have perceived that other approaches such as game-based approach could be incorporated with microlearning to enhance the implementation of microlearning.

Therefore, 2 different architectures have been proposed. A Dual Architecture and The Integration Domain Architecture. These frameworks can be implemented in an organization that would want to venture into online training for their employees with different needs, preferences and learning goals. A Dual Architecture domain has been proposed to distinguish the micro-sized content from any gamified content. Micro-sized content is any microlearning related topic that is designed for a total duration of 5-7 minutes and gamified content is any topic that has been gamified without time restrictions. Both these contents are expected to provide knowledge on the relevant topics but with different objectives. An employee can choose to learn through short content or gamified content depending on their preferences.

The Integration domain architecture is to integrate the learning domain and evaluation domain. The Learning domain consists of any skills and development related topics. Whilst the evaluation domain is aimed to evaluate the employee's knowledge upon completion of any microlearning topic from the learning domain. Every topic learnt will be assessed with any gamification technique from the evaluation domain to measure the training effectiveness. This will aid to ensure the employee has learnt the desired topic and have achieved the needed skills and development. Conclusively, an employee with time constraints can choose to learn through the dual architecture which offers the short duration content while an employee with a specific learning goal can opt for the architecture that provides the evaluation feature. Overall, the proposed solutions are expected to leverage the employee's knowledge on microlearning and employees are also able to evaluate their knowledge acquisition.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Y.S. is the principal researcher of this study. F.F.C. and T.Y.L. provided the overall guidance of the research. All authors had approved the final version.

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