



## CRAFTING DIGITAL MICRO-STORYTELLING FOR SMARTER THAI YOUTH: A NOVEL APPROACH TO BOOST DIGITAL INTELLIGENT QUOTIENT

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### ABSTRACT

Aim/Purpose	To conduct a needs assessment and subsequently create micro-storytelling media aimed at enhancing the Digital Intelligence Quotient (DQ) of young individuals.
Background	In today's digital society, DQ – the ability to understand and use digital technologies responsibly, effectively, and ethically – has emerged as a vital skill that elevates individuals in all aspects of life, from daily living to education. To empower Thai youth, this study seeks to innovate DQ content by adapting it into a digital format known as micro-storytelling. This unique approach combines the art of storytelling with digital elements, creating engaging and effective micro-learning media.
Methodology	The methodology consists of three phases: (1) conducting a needs assessment for digital micro-storytelling; (2) developing digital micro-storytelling content and evaluating its quality; and (3) assessing the DQ among young individuals after their engagement with the digital micro-storytelling. The participants included 55 higher education learners for the needs assessment, five experts for the quality assessment of the digital micro-storytelling, and 30 learners in the experimental group. Data analysis involves PNI modified, mean, and standard deviation.
Contribution	This research contributes by providing a practical solution in the form of digital micro-storytelling tailored to the preferences and needs of Thai youth. It serves as a valuable resource for educators seeking to empower young learners with essential digital competencies.
Findings	The findings revealed three notable results: (1) learners showed a preference for self-paced learning within a digital environment, favoring video content, which

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	aligns with the use of digital micro-storytelling, and also showed a keen interest in developing their DQ; (2) the study's analysis confirms that digital micro-storytelling exhibits the highest degree of quality in its development, content, and utilization, as determined by expert evaluation (4.86); and (3) the overall findings of the assessment of DQ indicate a favorable level of proficiency (4.60).
Recommendations for Practitioners	Align materials with micro-learning principles, keeping content concise for effective knowledge retention. Empower learners to personalize their digital learning and promote self-paced exploration based on their interests.
Recommendations for Researchers	Researchers should continuously assess and update digital learning materials to align with the evolving digital landscape and the changing needs of learners and investigate the long-term effects of DQ improvement, especially in terms of online safety and digital literacy in learners' future lives and careers.
Impact on Society	This study's impact on society is centered around fostering DQ, advocating for innovative educational strategies, and empowering Thai youth with vital digital skills. The findings offer valuable insights that could lay the groundwork for future research on DQ among youth globally.
Future Research	Future studies could explore larger, diverse samples, cultural variations, and the effectiveness of digital micro-storytelling in enhancing DQ. This research paves the way for expanded studies in digital education and learner empowerment in the digital age.
Keywords	digital intelligence quotient (DQ), digital micro storytelling, needs assessment, Thai youth

## INTRODUCTION

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Thai youths, especially Generation Z, many of whom are currently pursuing higher education, have grown up immersed in the digital world. The ubiquity of digital devices and the internet has tightly woven the lives of this new generation into the fabric of online media and communication. While the digital age offers convenience, it also conceals hidden perils such as health risks, technology addiction, online fraud, cyber threats, and cyberbullying. The Thailand Cyber Wellness Index 2023 indicates that in Bangkok, over 82% of 10–15-year-olds are developing digital skills yet remain vulnerable to cyber threats. Furthermore, a significant majority lacks essential digital and cyber security skills, highlighting an urgent need for comprehensive digital literacy and safety education (The Story Thailand, 2024). Equipping Thai youth with a Digital Intelligence Quotient (DQ) is imperative to ensure their safety and well-being online (Sriwisathiyakun, 2023). DQ encompasses a broad set of skills crucial for navigating the digital world, including digital competence, which is the ability to use technology responsibly, make wise online choices, and stay safe from cyber risks. The practical aspect of DQ enables individuals to handle digital tools and content effectively. Beyond this, DQ is essential for a fulfilling and successful life in today's digital age, empowering individuals to thrive in various aspects of living, learning, and working (DQ Institute, 2017). Educational tools based on microlearning can effectively foster independent learning among learners. The use of microlearning strategies – such as concise videos and infographics – is crucial for capturing the attention of Generation Z, providing visually engaging content that boosts information recall, retention, and learner motivation. Additionally, embedding storytelling into these tools ensures that lessons are not only memorable but also resonate with real-world narratives, making the learning experience relevant and impactful (Choudhary & Pandita, 2023; Jain, 2023; Yuniarsih et al., 2022). To promote Thai youth, this research endeavors to transform DQ content – educational content or modules designed to enhance a person's DQ –

into a digital format known as micro-storytelling. Digital micro-storytelling represents a form of microlearning media that blends the art of storytelling with digital elements. It incorporates visual and textual components, audio recordings, songs, and videos. This is achieved by adapting the format with the aid of technology and aligning it with diverse learning styles, contextual relevance, and environmental factors. Importantly, it incorporates the microlearning model, which is characterized by delivering information in small, highly targeted segments. This approach proves ideal for swiftly addressing specific problems (Kolinski, 2022). The primary advantage of microlearning lies in its efficiency. It minimizes the time required for learning, ensures content availability on demand, and enhances memory retention by up to 20 percent. Consequently, learners spend 28 percent less time answering questions, resulting in improved topic retention. The human brain absorbs and retains information from concise content more effectively than from extensive materials (Ngampolkrung et al., 2023).

This research aims to investigate the essential requirements for the development of digital micro-storytelling. The goal is to establish effective learning guidelines and address the most pertinent educational needs among learners. Recognizing the significance of needs assessment, the researcher emphasizes its role in bridging the gap between what should be and what currently exists (Klaharn, 2017). This process facilitates informed decision-making in selecting or developing digital storytelling and microlearning content that aligns with the real conditions and needs of learners. Ultimately, the research seeks to enhance the DQ of a small group of Thai youths who are studying an education career through the application of digital micro-storytelling. Its insights can serve as a foundation for future research on DQ among youth worldwide. This study aims to answer the following research questions:

- (1) What are the learner's needs for developing digital micro-storytelling to enhance DQ?
- (2) How does the developed digital micro-storytelling impact learners' DQ?

### ***DIGITAL INTELLIGENCE QUOTIENT (DQ)***

'Digital competence' has emerged as a fundamental concept when discussing the skills and knowledge required by citizens in today's knowledge society (van Laar et al., 2017). It is possible that digital intelligence could become the most crucial form of intelligence for success in the digital era (Stiakakis et al., 2019). The DQ Institute, a global initiative dedicated to fostering a new form of digital literacy known as Digital Intelligence Quotient (DQ), has introduced a novel framework. DQ is considered an essential skill in contemporary society due to the widespread use of technology and digital platforms. It encompasses an individual's social and personal aspects of technology use, as well as their practical abilities in utilizing technology for daily life and managing security threats in the digital age (DQ Institute, n.d.). To fully harness the advantages of technology, individuals must possess knowledge and understanding aligned with digital competence, including information management, collaboration, communication, content creation, ethical responsibilities, problem-solving, and technical operations (van Laar et al., 2017).

In nurturing learners with digital intelligence competencies, educators or teachers should also incorporate reflections on digital competence into their teaching. Recent research within the DQ framework defines DQ as a set of interconnected social, emotional, and cognitive abilities that enable individuals to meet the challenges and adapt to the demands of digital life (DQ Institute, n.d.; Glazunova et al., 2021; Wannapiroon & Wattananaiya, 2017). These abilities can be categorized into eight key areas. The first aspect is Digital Identity, which involves shaping and managing an online persona and controlling its short-term and long-term effects. Digital use pertains to the effective use of digital devices while balancing online and offline life. Digital Safety focuses on managing online risks and handling problematic content. Digital Security involves navigating online risks, addressing issues, and mitigating potential threats. Digital Emotional Intelligence is essential for fostering positive online relationships, while Digital Communication facilitates effective digital interaction and collaboration. Digital Literacy includes finding, evaluating, using, sharing, and creating digital content, along with

computational thinking. Lastly, Digital Rights encompass understanding and upholding personal and legal digital rights, including privacy. According to this framework, DQ appears to offer a valuable structure for implementation within an educational context. These encompass a wide array of technical, cognitive, meta-cognitive, and socio-emotional competencies rooted in universal ethical values. These competencies empower individuals to address the challenges and opportunities presented in the digital landscape. This study utilizes this DQ framework to investigate and evaluate the requirements of young individuals and identify precise content that caters to their skill development needs.

### ***NEEDS ASSESSMENT***

Needs assessments are simply systematic processes for collecting information and making justifiable decisions. It is used in many disciplines and professionals and is recognized as a valuable instrument for not only identifying the requirements of a program but also serving other essential functions such as strategic planning for resource allocation, establishing priorities, and enhancing the trajectory of an existing program (Diori, 2021). This constructive tool, often seen as evaluative, provides insights and guidance that assist stakeholders in developing program plans and rationales (Chen, 2015) while also serving as a process and instrument for pinpointing disparities or gaps between current states and desired outcomes. This information, gathered from individuals, forms the basis for decision-making and strategic planning, enabling the establishment of appropriate development guidelines. Various data collection methods, such as questionnaires, interviews, and group discussions, are employed for this purpose. A needs assessment comprises four key stages. First is planning, which involves creating a carefully organized plan for the needs assessment. The second is question formulation, where relevant questions are developed to gather valuable insights from learners about their specific requirements. The third is choosing data collection methods, which focus on selecting the appropriate methods for collecting data to gather relevant information from learners. The last is data analysis and prioritization, where the collected data is thoroughly analyzed to pinpoint the most crucial needs, facilitating well-informed decision-making (ICF-CDC DASH Professional Learning Collaborative, 2019). Needs assessment models operate differently based on diverse requirements, intentions, objectives, and situations (Adams et al., 2021; Leigh et al., 2000; Ramesh et al., 2019). The Priority Needs Index (PNI) methodology, improved by Wongwanich et al. (2014) from its original formulation, functions as a vital approach for identifying disparities. It achieves this by calculating the discrepancy between two critical elements: Importance (I) and Deprivation (D). This differential calculation is subsequently standardized by division by the Deprivation value (D). The primary purpose of this standardization process is to ensure that the evaluation of essential needs is conducted within a constrained range, thereby mitigating excessive variation while upholding its meaningful comparative value. When employed to evaluate the current status quo, this PNI framework establishes the fundamental groundwork for estimating the expected rate of development within a specific group or community by PNI Modified =  $(I-D)/D$ . In this study, the researcher opted for a pairwise questionnaire to capture the learners' needs effectively.

### ***DIGITAL MICRO-STORYTELLING***

Digital storytelling offers numerous advantages to learners, providing them with an exceptional learning experience. This technology tool is particularly effective in cultivating skills and motivation among learners. It was initially conceived as a means of fostering community engagement, growth, and empowerment (de Jager et al., 2017). It entails the integration of storytelling with digital audio and visual elements to craft a short time lasting between three to five minutes, often characterized by its reflective and emotional depth (Lambert & Hessler, 2018). Unlike traditional storytelling, digital storytelling is characterized by its emphasis on concise message delivery. It leverages various digital formats such as video clips, motion graphics, weblogs, or other accessible mediums (Bamrungcheep & Phosri, 2022; Dreon et al., 2011; Morra, 2014). Such integration of narrative content with audiovisual elements not only secures the attention of Generation Z – known for their digital savvy – but also promotes digital literacy, contributing to more effective learning and adept use of technology. This contemporary approach to education supports a constructivist learning environment where learners

are actively engaged, thereby enhancing overall educational outcomes (Sayavaranont & Wannapiroon, 2017; Smeda et al., 2014).

Together with microlearning, an educational method employed across various platforms leverages the principles of short-term and long-term memory to enhance learners' retention. With a focus on condensed learning activities ranging from one to fifteen minutes, microlearning is accessible on multiple devices and provides numerous benefits. These benefits include enhanced retention of concepts, increased learner engagement, improved motivation, support for collaborative learning, and better overall learning ability and performance (Halbach & Solheim, 2018; Jomah et al., 2016; Nikou & Economides, 2018; Shail, 2019; Sirwan Mohammed et al., 2018). Studies have shown that microlearning effectively promotes learning by providing bite-sized pieces of information that integrate easily into daily routines, offering on-demand learning and increasing flexibility and agility. This method equips learners with the necessary knowledge and skills, allowing access to the latest information whenever and wherever needed in a format that best suits their preferences (Sirwan Mohammed et al., 2018; Xie et al., 2023). Moreover, Alias and Abdul Razak (2023) identified two critical aspects of microlearning's pedagogical design: the content must be concise and focused, and the instructional flow should support the integration of learning into daily life. This enhances continuous education and ensures that microlearning activities are aligned with specific learning objectives, employing various engaging media formats such as videos, apps, gamification, infographics, and social media to encourage interaction and practical application.

Digital micro-storytelling is a method that combines digital storytelling and micro-learning to swiftly address specific problems, with each session typically lasting around five minutes. However, the duration may vary based on individual needs and context. Each learning unit focuses on a single problem or question and can encompass various content types, including video tutorials, audio podcasts, presentations, interactive activities, games, scenarios, assessments, text-based guidance, and concise online lessons. These resources can be accessed through electronic devices such as mobile phones. Micro-storytelling promotes learning by featuring relatable protagonists or situations, often dividing stories into brief segments, each ending with a cliffhanger to encourage learners to proceed to the next unit. Content preparation involves storytelling through videos, motion graphics, weblogs, or other accessible formats (Abdulrahman et al., 2020). Lukin's (2019) study emphasizes the benefits of micro-storytelling in educational settings, highlighting how it can significantly increase learner engagement and improve memory retention. This technique enriches the learning experience by connecting academic content with learners' narratives, promoting active participation, and fostering a strong classroom community, which can lead to better learning outcomes. Integrating storytelling into microlearning involves creating engaging narratives that can be consumed quickly and with flexibility. This can be done by identifying a relatable protagonist or situation for the learners, dividing the narrative into short, suspenseful segments of no more than five minutes to encourage continual engagement, and presenting the content through various mediums like animated videos, text, or online tutorials. This approach allows educators to combine the memorability of storytelling with the convenience of microlearning, offering bite-sized learning modules that address specific learner needs and issues in an accessible story format (Santos, n.d.).

The development of digital micro-storytelling adapts the process of creating digital storytelling by focusing on micro-content. Pratt and Hill (2013) proposed a concise 10-step process for digital storytelling, which starts with brainstorming and script writing. This is followed by storyboarding and script editing in step two. Step three involves file organization, while step four entails selecting the necessary tools and software. Step five is about recording the stories, and step six addresses image handling. In step seven, copyright and credits are emphasized. Step eight focuses on production, and step nine involves exporting the video and archiving the project. The process concludes with step ten, which emphasizes sharing the stories with the target audience. Meanwhile, Morra (2014) outlined the digital storytelling process, commencing with conceptualization, followed by research, story writing, storyboarding, multimedia tool exploration, creation, sharing, reflective evaluation, and receiving

feedback. Zhang et al. (2022) proposed a framework that outlines our approach to visual data storytelling, focusing on three primary perspectives: concept, component, and procedure. This framework serves as a guide for understanding how to effectively convey narratives through visual data representations. Göksün and Gürsoy (2022) identified the key stages of digital storytelling where challenges often arise and suggested measures to mitigate such issues. Their research aimed to enhance the digital storytelling abilities of pre-service science teachers. This study involved the creation of digital stories, with a focus on evaluating and describing these artifacts across various contexts. The identified dimensions for assessment included planning, content, mechanics, story structure, and use of technology. In this research, the digital storytelling concepts drawn from Morra (2014), Zhang et al. (2022), and Göksün and Gürsoy (2022) have been customized for digital micro-storytelling production. This adapted approach incorporates a six-step process: idea, research, plan, create, refine, and share.

The review highlights the necessity of DQ development yet reveals a gap in tailored educational approaches for Thai youth's digital competencies. Through a targeted needs assessment, this research identifies a crucial gap in DQ enhancement for Thai youth, which it aims to address with a tailored digital micro-storytelling approach. The findings will inform the development of content that directly responds to the specific digital competencies required by the learners.

## RESEARCH METHODOLOGY

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### *PHASE I: NEEDS ASSESSMENT OF DIGITAL MICRO-STORYTELLING DEVELOPMENT*

In this initial phase, the researcher focuses on assessing the requirements for developing digital micro-storytelling. The primary objectives are to analyze and prioritize these essential needs. This is accomplished by conducting a comparative analysis between the current state and the desired conditions for digital micro-storytelling development. The operational details of Phase I are outlined as follows:

#### **Research instruments and data analysis**

To craft media that aligns with the specific needs of the target group, the researcher has designed a comprehensive needs assessment form. This assessment tool serves the purpose of evaluating youth's requirements concerning digital micro-storytelling. The assessment collects pertinent background information from the participants. The dual-response estimation scale employs a 5-level estimation scale and solicits responses in a dual-response manner, probing the existing conditions and participants' expectations. The researcher analyzes and prioritizes these essential needs by juxtaposing the current state with the anticipated conditions for digital micro-storytelling development.

This prioritization utilizes the Priority Needs Index (PNI) Modified method, calculated as follows:  $PNI \text{ Modified} = (I - D) / D$  (PNI Modified denotes the priority ranking index of essential needs, where Expectation Mean (I) signifies the average expectation, the current stage mean (D) represents the mean for the current state). The questionnaire, presented in a dual-response format, features a set of questions for participants to rate on a scale. Respondents respond to both their current and desired levels of practice in each item. The interpretation of mean values is categorized into five levels, spanning from the lowest level of proficiency (score of 1) to the highest level of expertise (score of 5).

The evaluation of the needs assessment form's consistency is a critical step in ensuring its effectiveness. To select questions that demonstrate coherence, an Index of Content Consistency (IOC) method is employed, with an IOC value range of 0.67 to 1.00 indicating completeness. Data analysis is carried out using descriptive statistical analysis techniques, encompassing frequency, percentage, mean, and standard deviation calculations. These analyses aim to ascertain the precision and reliability of the needs assessment form. The IOC method involves the input of five experts, comprising

two educational technology specialists, one curriculum and teaching expert, and two information technology experts, who collectively assess and provide feedback on the assessment's content consistency. This rigorous evaluation process ensures that the needs assessment form accurately captures the essential insights required for effective digital micro-storytelling development.

### Data collection and participants

In this study, the population of undergraduate learners from the School of Industrial Education and Technology at KMITL enrolled in the course Media and Digital Technology for Learning in 2/2023 was surveyed due to its small size, making it feasible to include all members. The survey consisted of a questionnaire distributed to all 55 members (2 classes) of the population.

The findings derived from the needs assessment conducted among these learners will serve as valuable information for the subsequent development of micro-storytelling solutions tailored to meet the specific needs of this learner cohort.

### *PHASE II: DIGITAL MICRO-STORYTELLING MEDIA DEVELOPMENT*

Using the insights gained from the needs assessment, the researcher has applied this information to guide the creation of digital micro-storytelling. This development process involves six clear and defined steps (Göksün & Gürsoy, 2022; Morra, 2014; Zhang et al., 2022), as illustrated in Figure 1 and detailed in Table 1.



Figure 1. The development process of the digital micro-storytelling framework

Table 1. The process of developing digital micro-storytelling

Processes	Description
Idea	The researcher selects a media development model within the DQ domain. This involves conceptualizing the contents, defining the storyline, and aligning it with the findings from the needs assessment. The media is crafted in the form of micro-learning videos with animations by short learning within 3 minutes per lesson and hosted on a digital platform, focusing on digital safety, digital security, and digital literacy.
Research	Extensive research is conducted to gather relevant information for story design. This phase involves studying the media production process and assessing suitable software and applications, such as Adobe Photoshop, Adobe Premiere, Blender, Canva, Powtoon, Camtasia, and Animaker.

Processes	Description
Plan	Collaborative meetings are held with the project team to develop the scripts and storyboard, aligning it with the digital storytelling development process. Detailed planning is undertaken, including environment design, model architectures, making the scenes, and outlining the storyline progression. The entire shooting process is completed within a four-week timeframe.
Create	Developing the animation and creating the characters, followed by the editing process in the studio. All content is rigorously reviewed for accuracy and alignment with the defined objectives.
Refine	The media is submitted for evaluation by a panel of five experts, who provide feedback and recommendations. The media is subsequently improved and edited in accordance with the experts' opinions.
Share	The final, refined media is published on a dedicated YouTube channel in preparation for testing with sample groups in the subsequent phase of the project.

### Research instruments and data analysis

For the assessment of digital micro-storytelling quality, a panel of five experts was assembled. Their evaluation encompassed the analysis of mean values, the determination of opinion levels, and the calculation of standard deviations. The interpretation of mean values is stratified into five distinct levels, ranging from the highest quality level, 'Most appropriate' (averaging between 4.50 and 5.00), to the lowest quality level, 'needs improvement' (averaging between 1.00 and 1.49). To meet the criteria for quality acceptance, each aspect under scrutiny must attain an average rating of 3.50 or higher. In essence, this entails that each aspect should demonstrate a superior level of quality.

### Data collection and participants

This comprised five experts: two experts in digital media design, two specialists in educational technology, and one authority in curriculum development and teaching methodologies.

### *PHASE III: DIGITAL INTELLIGENCE QUOTIENT ASSESSMENT*

In this phase, researchers conducted digital micro-storytelling media with an experimental sample group to investigate the results of DQ.

### Research instruments and data analysis

The DQ self-assessment employed in this study included the interpretation of mean values, which were categorized into five distinct levels. Data analysis using mean and standard deviation (S.D.) calculations was employed for this purpose. Interpretation of the results was based on established thresholds: 4.50–5.00 indicating a 'Highest' significance level, 3.50–4.49 denoting 'High' importance, 2.50–3.49 reflecting a 'Moderate' significance level, 1.50–2.49 indicating 'Low' importance and 1.00–1.49 signifying 'Very Low' significance.

### Data collection and participants

*Population:* The population comprises undergraduate learners from the School of Industrial Education and Technology at KMITL. Specifically, those enrolled in the course Media and Digital Technology for Learning in 2/2023 totaled 55 registered individuals (2 classes).

*Sample group:* In this study, the researcher selected 1 class from 2 classes, comprising 30 undergraduate learners who were enrolled in the course Media and Digital Technology for Learning in 2/2023. These participants represented the youth demographic pursuing bachelor's degree-level education.



## FINDINGS

### *NEEDS ASSESSMENT*

In this study, the demographic characteristics of the 55 learner participants reveal a significant gender disparity among participants, with females comprising 74.55% and males 25.45%. Age-wise, a majority of 54.55% are over 20 years old, followed by the 19-20 year age group at 36.36%, and a smaller representation of those below 19 years at 9.09%. In terms of academic performance, most participants have a GPA ranging from 2.00 to 3.00 (69.09%), with a quarter of the cohort (25.45%) exceeding a 3.00 GPA and only a minority (5.45%) falling below 2.00. Regarding device ownership, all participants own a smartphone, a high proportion (89.09%) own tablets, and desktop computer ownership is notably lower at 7.27%. These statistics illustrate the predominance of female participants and a trend towards higher academic achievement, as well as the ubiquity of smartphones as the primary device for digital interaction in this demographic. Evaluated the fundamental requirements for digital micro-storytelling to augment DQ among Thai youths, which can be categorized into three distinct components, as shown in Table 2.

**Table 2. The PNI modified, and priority for the development of digital micro-storytelling (n=55)**

Assessment items	Current stage		Expectation		Priority	
	Mean	S.D.	Mean	S.D.	PNI modified	Priority
<b>The imperative of digital learning environment</b>						
Elevating self-paced learning in a digital landscape	3.18	0.51	4.27	0.59	0.34	1
Assessing readiness and self-planning for learning	3.22	0.62	4.25	0.55	0.32	2
Appraising self-responsibility in online education	3.44	0.63	4.31	0.66	0.25	5
Proficiency in harnessing technology and innovation for learning	3.53	0.71	4.49	0.68	0.27	4
Monitoring and assessing personal learning progress	3.25	0.67	4.24	0.63	0.30	3
<b>The preferred format for digital micro-storytelling</b>						
Infographic	3.62	0.65	4.42	0.68	0.22	2
Podcast	3.71	0.65	4.47	0.57	0.21	3
Video	3.38	0.67	4.33	0.57	0.28	1
Game	3.76	0.54	4.51	0.60	0.20	4
Blog	3.62	0.73	4.38	0.65	0.21	3
<b>DQ Improvement goal</b>						
Digital communication	3.98	0.67	4.51	0.74	0.13	5
Digital rights	3.56	0.78	4.29	0.71	0.20	4
Digital emotional intelligence	3.44	0.76	4.35	0.69	0.26	3
Digital safety, digital security, digital literacy	3.33	0.60	4.31	0.66	0.30	1
Digital use, digital identity	3.62	0.59	4.60	0.59	0.27	2

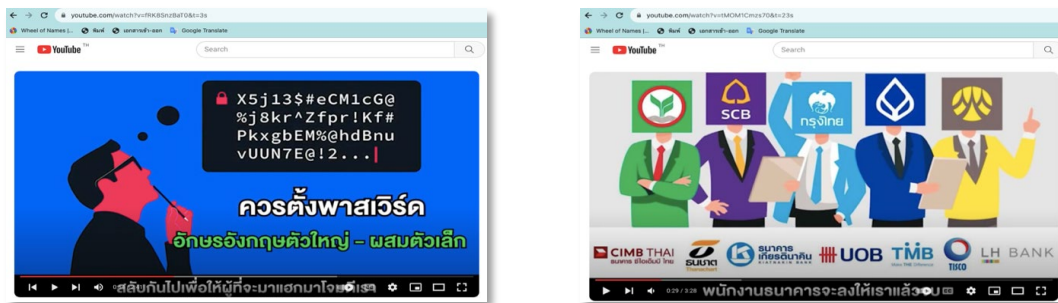
In the context of enhancing the digital learning environment, it was identified that learners express a strong preference for personalizing their digital learning experiences to the highest extent possible. This preference is underscored by a notable Priority-Need Index (PNI) modified value of 0.34, signifying its status as the foremost necessity. In response to this finding, the researcher intends to leverage this data to curate tailored activities and resources that cater to learners in “Elevating self-paced learning in a digital landscape.”

Regarding the preferred format for digital micro-storytelling, the investigation revealed that learners exhibit a pronounced inclination toward the creation and consumption of digital video media formats, as indicated by a PNI modified value of 0.28, designating it as the paramount need. Building upon this insight, the research endeavors to craft and deliver a series of five video sets utilizing digital storytelling techniques, thereby affording learners access to content that aligns with their preferences, conveniently hosted on the YouTube platform.

As for the DQ improvement goal, the study pinpointed three key areas of paramount importance: digital safety, digital security, and digital literacy, each earning a PNI modified value of 0.30, solidifying their status as the highest-priority needs. Considering these findings, the research is focused on devising educational content that emphasizes digital safety, mitigating online risks, and enhancing digital literacy skills among learners.

### ***ASSESSMENT OF DIGITAL MICRO-STORYTELLING MEDIA QUALITY BY EXPERTS***

The outcomes of the needs assessment culminated in the creation of digital micro-storytelling, presented in a video format accessible online. These digital narratives are characterized by their brevity, clarity, and ease of comprehension, incorporating elements such as audio, static imagery, and dynamic visuals. They are meticulously constructed through a digital storytelling methodology, ensuring accessibility within the digital realm. To facilitate learners’ seamless access, the researcher has strategically placed these digital video materials on a dedicated YouTube channel, thereby enabling learners to engage with the content conveniently, at their discretion, and from any location, as exemplified in Figure 2.



(a) “My secure username and password”

(b) “Safe online buying and selling”

**Figure 2. An example of screenshots in digital micro-storytelling contents**

The evaluation of digital micro-storytelling quality, conducted by experts, has been categorized into three distinct domains: content assessment, technical aspects encompassing development, and implementation. The results of the data analysis about these domains are presented in Table 3, which encapsulates the experts’ assessments of the quality of digital micro-storytelling.

**Table 3. Quality assessment of digital micro-storytelling by experts (n=5)**

Assessment items	Expert's evaluation		
	$\bar{X}$	S.D.	Level
<b>Content determination</b>			
Alignment with learning objectives	4.67	0.47	Most Appropriate
Comprehensiveness and accuracy	5	0.00	Most Appropriate
Logical content sequence	5	0.00	Most Appropriate
Clarity and appropriateness of language	5	0.00	Most Appropriate
Accessibility and comprehension	5	0.00	Most Appropriate
<b>Average</b>	<b>4.93</b>		Most Appropriate
<b>Technical development components</b>			
Conformance to digital storytelling steps	4.67	0.47	Most Appropriate
Ease of accessible placement	5	0.00	Most Appropriate
Effective media integration	5	0.00	Most Appropriate
Element clarity and short	4.67	0.47	Most Appropriate
Optimal length for learning	4.67	0.47	Most Appropriate
<b>Average</b>	<b>4.80</b>		Most Appropriate
<b>Implementation</b>			
Ubiquitous learning	4.67	0.47	Most Appropriate
Versatile reusability	4.67	0.47	Most Appropriate
Encourages lifelong learning	5	0.00	Most Appropriate
Boosts digital intelligence	5	0.00	Most Appropriate
Adapts to digital learning era	5	0.00	Most Appropriate
<b>Average</b>	<b>4.86</b>		Most Appropriate
<b>Total average</b>	<b>4.86</b>		Most Appropriate

The analysis of expert opinions has revealed that digital micro-storytelling exhibits an overall commendable level of quality. When examining individual aspects, it becomes evident that the highest mean values are associated with content determination (mean = 4.93, deviation = 0.09) and technical development (mean = 4.80, deviation = 0.28), closely followed by utilization (mean = 4.86, deviation = 0.18).

Regarding content assessment, the findings indicate that the content is comprehensive, accurate, and aligns effectively with the research topic. The ranking of content presentation is deemed appropriate and easily comprehensible. Furthermore, the language employed for conveying the message is precise, lucid, and apt for the target audience, facilitating clear communication. These attributes collectively attain the highest average rating (mean = 4.93, deviation = 0.09).

In terms of development techniques, it is observed that digital micro-storytelling is adeptly situated on an easily accessible learning platform. The arrangement of internal elements, including visuals, animations, audio, and text, is found to be well-suited to the content, achieving a top-tier average rating (mean = 4.80, deviation = 0.28).

Regarding the implementation of digital micro-storytelling, it emerges as a powerful tool for promoting lifelong learning and bolstering Digital Intelligence, thereby effectively catering to the demands of learning in the digital era. This achievement is reflected in the highest average rating (mean = 4.86, deviation = 0.18).

### ***LEARNER'S DIGITAL INTELLIGENCE QUOTIENT ASSESSMENT***

Based on the self-assessment of DQ among a sample group of 30 individuals, the findings revealed a range of DQ levels. The highest score observed was 4.75 in digital skills and adaptability, while the high score recorded was 4.33 in cybersecurity and responsible behavior, and the highest score with digital literacy and information evaluation and online communication and creation was 4.67. These

results collectively indicate that the evaluation outcomes are indicative of a satisfactory level of DQ proficiency. The results of the DQ assessment for the sample group are represented in Table 4.

**Table 4. DQ assessment (n=30)**

Items	DQ Level			
	Mean	Percentage	S.D.	Level
Digital literacy and Information evaluation	4.67	93.33	0.47	Highest
Cybersecurity and responsible behavior	4.33	86.67	0.47	High
Digital skills and adaptability	4.75	95.00	0.43	Highest
Online communication and creation	4.67	93.33	0.47	Highest
<b>Total Average</b>	<b>4.60</b>	<b>92.00</b>		<b>Highest</b>

## DISCUSSION

### *THE LEARNER NEEDS TO DEVELOP DIGITAL MICRO-STORYTELLING TO ENHANCE DQ*

The study indicates a strong preference among learners for self-paced learning within digital environments, which is underscored by the highest PNI modified value of 0.34. This reflects a critical demand for customizable learning schedules that allow learners to study at their rhythm. Rojprasert et al. (2012) and Geng et al. (2019) have previously noted the significance of an accommodating digital infrastructure to the success of self-paced education. Microlearning supports this demand by providing succinct and specific educational snippets, allowing learners to digest content at a comfortable pace that fits their learning styles, as emphasized by Nikkhoo et al. (2023) and Bontisesari et al. (2023). The learners' technological adeptness is a key factor in this personalized learning, as shown by du Toit-Brits and van Zyl (2017) and Rashid and Asghar (2016), and the current widespread availability of mobile technology further enriches the spectrum of self-paced learning experiences available to learners.

As for the preferred digital micro-storytelling format, video media holds the highest average PNI modified value of 0.28, marking it as the essential format in this context. The implementation of digital micro-storytelling in video format combines microlearning principles with storytelling methods. This aligns with Shahid and Khan (2022) and Bontisesari et al. (2023), who affirm the transformative impact of multimedia storytelling in education, utilizing audio, video, and graphics. Likewise, Moore and Miller (2020) suggest that digital storytelling through video effectively facilitates learning and knowledge acquisition.

Furthermore, digital storytelling allows learners to critically engage with their environment, fostering fundamental knowledge and skills, as noted by Gregori-Signes (2014) and Smeda et al. (2014). It boosts confidence and enhances social and cognitive competencies, emphasizing the pedagogical value of digital storytelling in video format. Within the DQ enhancement goal, digital safety, security, and literacy are primary needs with a PNI modified value of 0.30, identified as essential requirements. Dostál et al. (2017) state that digital literacy is a core component of digital intelligence, entailing proficient use of digital technology with an awareness of legal and ethical standards. Stiakakis and Barboutidis (2022) further expand on DQ to include a range of competencies such as logical reasoning, algorithms, evaluation, abstraction, decomposition, pattern recognition, digital emotional intelligence, communication, safety, security, identity management, digital literacy, and an understanding of digital rights.

## ***THE IMPACT OF DIGITAL MICRO-STORYTELLING ON LEARNERS' DQ***

The impact of digital micro-storytelling on learners' DQ has been substantial. This research has introduced digital storytelling media offering bite-sized content consistent with microlearning principles, accessible on YouTube. This format has been acknowledged for facilitating self-directed learning, as evidenced by Rahmatika et al. (2021) and Yousef et al. (2014), who underscore YouTube's value in education. However, the video content on YouTube must be customized to meet learners' specific content needs, age, and cognitive development. To improve the effectiveness of content that teaches digital safety, security, and literacy, incorporating elements such as efficiency, pedagogical strategies, content design, and reflective practices into digital video media is crucial. This approach not only aligns with Kolinski's (2022) microlearning concept, which emphasizes content that is easily accessible, especially on mobile devices but also supports Chan et al.'s (2017) findings that digital storytelling through video enhances digital proficiency. The video format is especially suitable for its conciseness and adherence to microlearning principles, with each unit addressing a distinct problem or goal. Moreover, the research results, showing the highest average DQ levels among learners after interacting with digital micro-storytelling media, echo Sirwan Mohammed et al.'s (2018) claim that microlearning can enhance learning results by up to 18% when compared with traditional methods, thus enhancing learners' enthusiasm, motivation, and memory retention, especially since these brief lessons aid in building long-term memory.

The significance of DQ for young people lies in their ability to navigate the digital world securely, encouraging proactivity and metacognition. The DQ learning program combines animation and storytelling to make learning enjoyable and educational. According to Liau et al. (2012) and the DQ Institute (2017), surveys indicated that 92% of learners found it helpful for learning safe internet use, with 90% finding it more engaging and fun. Aligned with this, the study's results suggest a satisfactory level of DQ proficiency among learners, with a focus on digital micro-storytelling to empower young individuals. Completing digital micro-storytelling DQ lessons can lead to increased discernment, critical thinking, and improved online safety practices.

## **CONCLUSION**

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This research underscores the growing importance of Digital Intelligence (DQ) in the education of Generation Z learners, particularly in Thailand's digital landscape. As we navigate the opportunities and challenges of the digital age, it is imperative to equip youth with the necessary skills to thrive safely and successfully online.

Introducing digital micro-storytelling as an innovative educational approach represents a positive step forward. By blending storytelling with multimedia elements, we can effectively cater to individual learning preferences, enhance memory retention, and address specific digital issues swiftly and efficiently. This method, rooted in microlearning and storytelling principles, offers a promising avenue for empowering learners to take control of their digital learning experiences.

This research, guided by a thorough needs assessment, has revealed encouraging trends. Learners express a strong desire for digital media, particularly video, and are eager to bolster their digital intelligence in areas such as digital safety, security, and literacy. By aligning educational strategies with these preferences and needs, we can foster a more engaged and informed digital citizenry. However, implementing digital micro-storytelling also presents challenges. Ensuring access to necessary technology and resources for all learners, maintaining the relevance and currency of content in a rapidly evolving digital landscape, and overcoming potential resistance to change are among the obstacles that must be addressed.

Despite these challenges, the evaluation by experts has affirmed the quality and effectiveness of digital micro-storytelling as an educational tool. This underscores its potential to significantly enhance DQ among learners. Moving forward, continued refinement of this approach, coupled with ongoing

research and collaboration, will be essential to maximize its impact and ensure its successful integration into educational practice.

It is important to note that this study was conducted with a small sample of Thai youth, limiting the generalizability of the findings. However, these insights can serve as a valuable starting point for future research on DQ among youth globally. Future studies could explore larger and more diverse samples, consider cultural variations, and delve deeper into the effectiveness of digital micro-storytelling in enhancing DQ. This potential for further investigation highlights the significance of this research in paving the way for expanded studies in the field of digital education and learner empowerment in the digital age.

## REFERENCES

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- Abdulrahman, M. D., Faruk, N., Oloyede, A. A., Surajudeen-Bakinde, N. T., Olawoyin, L. A., Mejabi, O. V., Imam-Fulani, Y. O., Fahm, A. O., Azeez, A. L., & Imam-Fulani, Y. O. (2020). Multimedia tools in the teaching and learning processes: A systematic review. *Heliyon*, 6(11), e05312. <https://doi.org/10.1016/j.heliyon.2020.e05312>
- Adams, C. D., Baaki, J., & Stefaniak, J. E. (2021). Challenges faced by certified performance technologists in conducting needs assessment. *Performance Improvement Quarterly*, 33(4), 419–442. <https://doi.org/10.1002/piq.21329>
- Alias, N. F., & Abdul Razak, R. (2023). Exploring the pedagogical aspects of microlearning in educational settings: A systematic literature review. *Malaysian Journal of Learning and Instruction*, 20(2), 267–294. <https://doi.org/10.32890/mjli2023.20.2.3>
- Bamrungcheep, U., & Phosri, P. (2022). Digital storytelling innovation for the development of landscape inheritance process: Wisdom of gemstone cutting for the creative economy of Chanthaburi Province. *Journal of Social Sciences and Humanities Research in Asia*, 28(2), 53–66. <https://so05.tci-thaijo.org/index.php/psujssh/article/view/257693>
- Bontisesari, Dewanti, R., & Sulistyningrum, S. D. (2023). Development of microlearning-based and problem-solving infused English reading materials for non-English major: A needs analysis. *Asian Journal of Applied Education*, 2(2), 189–206. <https://doi.org/10.55927/ajae.v2i2.3782>
- Chan, B. S. K., Churchill, D., & Chiu, T. K. F. (2017). Digital literacy learning in higher education through digital storytelling approach. *Journal of International Education Research*, 13(1), 1–16. <https://doi.org/10.19030/jier.v13i1.9907>
- Chen, H. T. (2015). *Practical program evaluation: Theory-driven evaluation and the integrated evaluation perspective*. Sage Publications. <https://doi.org/10.4135/9781071909850>
- Choudhary, H., & Pandita, D. (2023). Maximizing learning outcomes in the digital age: The role of microlearning for Gen Z. *Development and Learning in Organizations*. Advance online publication. <https://doi.org/10.1108/DLO-02-2023-0038>
- de Jager, A., Fogarty, A., Tewson, A., Lenette, C., & Boydell, K. M. (2017). Digital storytelling in research: A systematic review. *The Qualitative Report*, 22(10), 2548–2582. <https://doi.org/10.46743/2160-3715/2017.2970>
- Diori, H. I. (2021). A critical insight into needs assessment technique and the way social needs are assessed. *Advanced Journal of Social Science*, 8(1), 3–9. <https://doi.org/10.21467/ajss.8.1.3-9>
- Dostál, J., Wang, X., Steingartner, W., & Nuangchalerm, P. (2017, November). Digital intelligence is a new concept in the context of the future of school education. *Proceedings of the 10th Annual International Conference of Education, Research, and Innovation, Seville, Spain*, 3706–3712. <https://doi.org/10.21125/iceri.2017.0997>
- DQ Institute. (n.d.). *What is the DQ framework?* <https://live.dqinstitute.org/dq-framework/>
- DQ Institute. (2017). *Digital Intelligence (DQ): A conceptual framework & methodology for teaching and measuring digital citizenship* [White paper]. <https://www.dqinstitute.org/wp-content/uploads/2017/08/DQ-Framework-White-Paper-Ver1-31Aug17.pdf>

- Dreon, O., Kerper, R. M., & Landis, J. (2011). Digital storytelling: A tool for teaching and learning in the YouTube generation. *Middle School Journal*, 42(5), 4–10. <https://doi.org/10.1080/00940771.2011.11461777>
- du Toit-Brits, C., & van Zyl, C.-M. (2017). Self-directed learning characteristics: Making learning personal, empowering, and successful. *Africa Education Review*, 14(3-4), 122-141. <https://doi.org/10.1080/18146627.2016.1267576>
- Geng, S., Law, K. M. Y., & Niu, B. (2019). Investigating self-directed learning and technology readiness in blending learning environment. *International Journal of Educational Technology in Higher Education*, 16, Article 17. <https://doi.org/10.1186/s41239-019-0147-0>
- Glazunova, O., Saiapina, T., Korolchuk, V., Kasatkina, O., & Voloshyna, T. (2021). Digital intelligence of a modern economist: An exploratory case study. *SHS Web of Conferences*, 104, 03001. <https://doi.org/10.1051/shsconf/202110403001>
- Göksün, D. O., & Gürsoy, G. (2022). Digital storytelling in science teacher education: Evaluation of digital stories. *Science Education International*, 33(2), 251-263. <https://doi.org/10.33828/sci.v33.i2.13>
- Gregori-Signes, C. (2014). Digital storytelling and multimodal literacy in education. *Porta Linguarum*, 22, 237-250. <https://doi.org/10.30827/Digibug.53745>
- Halbach, T., & Solheim, I. (2018, October). Gamified micro-learning for increased motivation: An exploratory study. *Proceedings of the 15th International Conference on Cognition and Exploratory Learning in the Digital Age, Budapest, Hungary*, 255-262. <https://files.eric.ed.gov/fulltext/ED600597.pdf>
- ICF-CDC DASH Professional Learning Collaborative. (2019). *Improving professional development offerings: Conducting a needs assessment*. [https://www.cdc.gov/healthyyouth/professional\\_development/docs/ConductingNeedsAssessment508.docx](https://www.cdc.gov/healthyyouth/professional_development/docs/ConductingNeedsAssessment508.docx)
- Jain, A. (2023). *Cracking the code: How to engage Generation Z in meaningful learning experiences*. CommLab India. <https://blog.commlabindia.com/elearning-design/corporate-training-learning-strategies-genz>
- Jomah, O., Masoud, A. K., Kishore, X. P., & Aurelia, S. (2016). Microlearning: A modernized education system. *Broad Research in Artificial Intelligence and Neuroscience*, 7(1), 103-110. <https://lumenpublishing.com/journals/index.php/brain/article/view/1986>
- Klaharn, R. (2017). The need assessment for improving the competence of Thai teachers in the measurement and evaluation of analytical thinking. *PUPIL: International Journal of Teaching, Education, and Learning*, 1(2), 1-16. <https://doi.org/10.20319/pijtel.2017.12.116>
- Kolinski, H. (2022, December 3). Understanding microlearning: Definition, benefits, and examples. *eLearning Blog*. <https://www.ispringsolutions.com/blog/what-is-microlearning>
- Lambert, J., & Hessler, B. (2018). *Digital storytelling: Capturing lives, creating community* (5th ed.). Routledge. <https://doi.org/10.4324/9781351266369>
- Leigh, D., Watkins, R., Platt, W. A., & Kaufman, R. (2000). Alternate models of needs assessment: Selecting the right one for your organization. *Human Resource Development Quarterly*, 11(1), 87-93. [https://doi.org/10.1002/1532-1096\(200021\)11:1<87::AID-HRDQ7>3.0.CO;2-A](https://doi.org/10.1002/1532-1096(200021)11:1<87::AID-HRDQ7>3.0.CO;2-A)
- Liau, A. K., Tan, T. K., Li, D., & Khoo, A. (2012). Factorial invariance of the Personal Strengths Inventory-2 for children and adolescents across school level and gender. *European Journal of Psychology of Education*, 27, 451-465. <https://doi.org/10.1007/s10212-011-0088-z>
- Lukin, K. (2019). Leveraging micro-stories to build engagement, inclusion, and neural networking in immunology education. *Frontiers in Immunology*, 10, 2682. <https://doi.org/10.3389/fimmu.2019.02682>
- Moore, A. K., & Miller, R. J. (2020). Video storytelling in the classroom: The role of narrative transportation. *Journal of Nursing Education*, 59(8), 470-474. <https://doi.org/10.3928/01484834-20200723-10>
- Morra, S. (2014, March 14). 8 steps to great digital storytelling. *Samantha Morra: Thoughts on Education*. <https://samanthamorra.com/2013/06/05/edudemic-article-on-digital-storytelling/>
- Ngampolkrung, P., Kruasom, P., & Plangsorn, B. (2023). Constructivism in micro-learning: New learning approaches in the contemporary world. *Journal of Education and Innovative Learning*, 3(2), 181–190. <https://so06.tci-thaijo.org/index.php/jeil/article/view/262965>

- Nikkhoo, I., Ahmadi, Z., Akbari, M., Imannezhad, S., Anvari Ardekani, S., & Lashgari, H. (2023). Microlearning for today's learners: A rapid review of essentials and considerations. *Medical Education Bulletin*, 4(1), 673-685.
- Nikou, S. A., & Economides, A. A. (2018). Mobile-based micro-learning and assessment: Impact on learning performance and motivation of high school learners. *Journal of Computer Assisted Learning*, 34(3), 269–278. <https://doi.org/10.1111/jcal.12240>
- Pratt, S., & Hill, A. (2013). *Digital storytelling guide*. University of Wollongong Library. [https://uow.lib-guides.com/ld.php?content\\_id=42727880](https://uow.lib-guides.com/ld.php?content_id=42727880)
- Rahmatika, R., Yusuf, M., & Agung, L. (2021). The effectiveness of YouTube as an online learning media. *Journal of Education Technology*, 5(1), 152-158. <https://doi.org/10.23887/jet.v5i1.33628>
- Ramesh, P., Raju, D. T., Reddy, K. M., Krishnan, P., Biswas, A., & Umamaheshwari, T. (2019). Perception of teaching competencies by administrators, faculty, and learners of Indian agricultural universities: An assessment of faculty training needs. *The Journal of Agricultural Education and Extension*, 25(4), 337-359. <https://doi.org/10.1080/1389224X.2019.1609997>
- Rashid, T., & Asghar, H. M. (2016). Technology use, self-directed learning, learner engagement, and academic performance: Examining the interrelations. *Computers in Human Behavior*, 63, 604–612. <https://doi.org/10.1016/j.chb.2016.05.084>
- Rojprasert, S., Nanchaleay, J., & Boonlue, S. (2012, February). Self-directed learning readiness study for undergraduate learners: A case study of principles and art of photography. *Proceedings of the International Conference on Learning Innovation in Science and Technology, Phuket, Thailand*. <https://www.slideshare.net/KruSuthin/full-paper-suthin-rojprasert>
- Santos, C. D. (n.d.). *Storytelling and microlearning, can they coexist in an online course?* DynDevice. <https://www.dyndevic.com/en/news/storytelling-and-microlearning-can-they-coexist-in-an-online-course-ELN-675/>
- Sayavaranont, P., & Wannapiroon, P. (2017). Why Generation Z's digital literacy can be improved through digital storytelling? *Journal of Mass Communication Technology*, 2(1), 64–73. <https://so05.tci-thaijo.org/index.php/jmctrmutp/article/view/251818>
- Shahid, M., & Khan, M. R. (2022). Use of digital storytelling in classrooms and beyond. *Journal of Educational Technology Systems*, 51(1), 603–617. <https://doi.org/10.1177/00472395221112599>
- Shail, M. S. (2019). Using micro-learning on mobile applications to increase knowledge retention and work performance: A review of literature. *Cureus*, 11(8), e5307. <https://doi.org/10.7759/cureus.5307>
- Sirwan Mohammed, G., Wakil, K., & Sirwan Nawroly, S. (2018). The effectiveness of microlearning to improve learners' learning ability. *International Journal of Educational Research Review*, 3(3), 32-38. <https://doi.org/10.24331/ijere.415824>
- Smeda, N., Dakich, E., & Sharda, N. (2014). The effectiveness of digital storytelling in the classrooms: A comprehensive study. *Smart Learning Environments*, 1, Article 6. <https://doi.org/10.1186/s40561-014-0006-3>
- Sriwisathiyakun, K. (2023). Utilizing design thinking to create digital self-directed learning environment for enhancing digital literacy in Thai higher education. *Journal of Information Technology Education: Innovations in Practice*, 22, 201-214. <https://doi.org/10.28945/5184>
- Stiakakis, E., & Barboutidis, G. (2022). Exploring the construct of the new way of thinking in the digital environment. *Behavior & Information Technology*, 41(13), 2779-2795. <https://doi.org/10.1080/0144929X.2021.1949042>
- Stiakakis, E., Liapis, Y., & Vlachopoulou, M. (2019). Developing an understanding of digital intelligence as a prerequisite of digital competence. *Proceedings of the Mediterranean Conference on Information Systems*, Paper 27. <https://aisel.aisnet.org/mcis2019/27>
- The Story Thailand. (2024, February 9). *AIS - Bangkok, organizing the "Cool Teen Stop Cyber Threats"*. <https://www.thestorythailand.com/en/09/02/2024/123335/>



- van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2017). The relation between 21st-century skills and digital skills: A systematic literature review. *Computers in Human Behavior*, 72, 577-588. <https://doi.org/10.1016/j.chb.2017.03.010>
- Wannapiroon, P., & Wattananaiya, N. (2017). Digital intelligence. *Journal of Technical Education Development*, 29(102), 12-20.
- Wongwanich, S., Sakolrak, S., & Piromsombat, C. (2014). Needs for Thai teachers to become a reflective teacher: Mixed methods needs assessment research. *Procedia - Social and Behavioral Sciences*, 116, 1645-1650. <https://doi.org/10.1016/j.sbspro.2014.01.450>
- Xie, D., Sriwisathiyakun, K., & Cui, J. (2023). Using microlearning to develop Chinese communication skills of primary learners. *Sripatum Review of Humanities and Social Sciences*, 23(2), 81-94. <https://so05.tci-thaijo.org/index.php/spurhs/article/view/265909/180486>
- Yousef, A. M. F., Chatti, M., & Schroeder, U. (2014). The state of video-based learning: A review and future perspectives. *International Journal on Advances in Life Sciences*, 6(3 & 4), 122-135.
- Yuniarsih, T., Sobandi, A., Meilani, R. I., Supardi, E., Indriarti, R., & Faldesiani, R. (2022). Analysis of micro-learning-based learning media needs: A retrospective study at vocational high school. *Proceedings of the 6th Global Conference on Business, Management, and Entrepreneurship* (pp. 3-6). Atlantis Press. <https://doi.org/10.2991/aebmr.k.220701.002>
- Zhang, Y., Reynolds, M., Lugmayr, A., Damjanov, K., & Hassan, G. M. (2022). A visual data storytelling framework. *Informatics*, 9(4), 73. <https://doi.org/10.3390/informatics9040073>

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