

Digital Storytelling and Intercultural Communicative Competence through English as a Foreign Language for Multilingual Learners

Supanida Kahanurak^{1,*}, Jarunee Dibyamandala¹ & Charin Mangkhang¹

¹Faculty of Education, Chiang Mai University, Chiang Mai, Thailand

*Correspondence: Faculty of Education, Chiang Mai University, 239 Huay Kaew Road, Suthep Sub-district, Muang District, Chiang Mai 50200, Thailand. Tel: 66-98-659-5854. E-mail: supanida_ka@cmu.ac.th

Received: August 12, 2022

Accepted: September 15, 2022

Online Published: December 30, 2022

doi:10.5430/jct.v12n1p14

URL: <https://doi.org/10.5430/jct.v12n1p14>

Abstract

In the age of rapid growth in technology, language education policies in the education system must proceed with a progressive and inclusive vision. Intercultural communicative competence (ICC) is also integral for language learners to avoid miscommunication and become knowledgeable of individuals with a myriad of ethnicities and beliefs. This study aims to examine the method of incorporating ICC with digital storytelling in English as a foreign language (EFL) class to promote inclusivity among multilingual students through an extensive literature review and reflection on English teaching in Thailand. The components and assessment of ICC, as well as the implementation of digital storytelling will also be discussed. Learning through multimedia production and intercultural stories can enhance the English skills of multilingual students when the teaching methodology is aligned with the geographical and cultural bedrock of language learners. Project-based instruction such as interviews, culture logs, and presentations representing both Western and local cultures are recommended to evaluate the English speaking skills of students.

Keywords: intercultural communicative competence, English as a foreign language, multilingual, digital storytelling

1. Introduction

Multilingual learners come from a variety of backgrounds and face challenges in achieving academically when they are not provided with adequate linguistic support (Kieffer, 2022). The word “multilingual” is defined as the ability to express oneself in several languages (Bussmann, 1996, p. 776). English as a foreign language means learning English in countries where English is not the native language (Iwai, 2011). In vocational domains, low communicative performance results in entrepreneurial losses directly linked to an insufficient cross-cultural understanding of the client's circumstances (Liton, 2016). To adapt multilingual students to the global era, it is highly practical to teach English as the lingua franca and determine the ways to approach the teaching of intercultural communicative competence (ICC) in English language classrooms to highlight the student's authentic identity. According to academic scholars J.M. Bennett, intercultural competence is the ability to communicate appropriately and effectively in varying cultural situations (Bennett, 2008). Communicative competence is defined as the knowledge of linguistic rules as well as the ability to apply the language interactively (Hymes, 1972). Michael Byram, a professor in linguistics and intercultural education, has stated in his book that ICC is the ability to communicate with people from varying social groups in another language (Byram, 1997/2020, pp. 53-56). He also argues that Hymes does not specifically address cross-cultural communication and designates that tutorials on non-verbal communication are to be conveyed in the foreign language classroom (Byram, 1997/2020, p. 29). The items that are contained in the dimensions of non-verbal communication include facial expressions, gaze, bodily movements, postures, body contact, spatial behavior, appearance and clothing, and non-spoken aspects in speech. An ICC syllabus combines the instruction of linguistic structures (phonemics, phonetics, syntax, and vocabulary), paralanguage (tongue clicks and loudness), and kinesics (communicative gestures, manners, and postures) (Poyatos, 1992).

The English instruction for multilingual students in Thailand is taken as a case study for this research as the country ranks 100 out of 112 countries in English proficiency (EF EPI, 2021). The language education policies in the Basic Education Core Curriculum of 2008 in Thailand delineate educational content that emphasizes English instruction, and other foreign languages including Chinese, French, German, Japanese, Arabic, and Pali are taught at the discretion of the schools. Also, intercultural education is stated in the national directive in Strand F2.1 and F2.2 with the objective

for learners to appreciate the connection and similarities between languages in Thai and foreign cultures (Ministry of Education, 2008). In addition, the survey of in-service Thai English-language teachers suggests that the English proficiency of Thai students is hampered due to the necessity for teachers to instruct students with scheduled lessons to prepare them for strenuous admission exams aligned with the national curriculum. The competitiveness of the Thai education system is underlined by the fact that students are not only given midterm and final exams but also required to take multiple national examinations, such as the O-Net, A-Net, and GAT/PAT and these are required as frequently as once every three years by the Thai University Center Admission System (TCAS) (Thanarachathapoom, 2020). Consequently, Thai English-language teachers indicated that there is insufficient time to follow Communicative Language Teaching (CLT) in the classroom to enhance the speaking skills of students of English, particularly in large classes in which increased funding for CLT evaluations is also required (Kwon, 2017).

In Thailand, it is noteworthy that there are about 70 ethnic minority groups (TSRI, 2021) which exemplify that teaching materials and language lessons should reflect the diverse population in the country. Yet, discursive differentiation of migrants persists in Thailand due to two primary factors. The first is Thai nationalism which stems from the “*Tai Rak Tai*” or “*Thai loves Thai*” mentality due to past wars between Thailand and Myanmar. Also, the anti-colonial sentiment that arose during the Franco-Siamese War of 1893 perpetuated a strong desire for Thai ethnocentrism (Winichakul, 2017). The second is the socio-economic hardships due to low salaries under the “minority status” that migrant students undergo (Ninchan, 2020). The obstacles of migrant students can be understood through the concepts of Karl Marx's conflict theory of education which illustrates society as an arena of conflict (Omer & Jabeen, 2016). According to Karl Marx, the education system maintains the reproduction of social classes wherein the educational institution is a social sphere run by the bourgeoisie, and the proletariat is exploited to benefit the upper class (Mishra, 2013). The perception that educational institutions serve as a place that supplies workforces to the capitalist market is reinforced by Bowles and Gintis (2011) affirming that jobs are made possible through the growth of capitalism that demands labor supply, and simultaneously keeping the compensation of workers at a minimum (Bowles & Gintis, 2011, p.1). These theories are demonstrated in reality through the struggle of migrant students in Thailand who receive low salaries. The minimum wage of Thai and migrant workers is currently 313-336 baht per day (Ministry of Labor, 2020). Hence, education and Thai and English fluency is immensely seen as a means to help minorities seeking better security in life to escape hard labor. Although migrant children can enroll in schools, the complex process of legal identification of migrant workers remains the prominent hurdle for them to learn Thai and English (Pholphirul & Rukumnuyakit, 2008). Currently, more than 200,000 migrants remain out of school and have not completed their secondary education (Save the Children, 2015). Yet, the creation of a new proposal in language learning in 2018 by the Office of the Royal Society highlights the importance of embracing multiculturalism in foreign language learning in Thailand. The proposal comprises six policies: (1) The central Thai language is taught for students to gain access to higher education, and the student's mother tongue/dialect is also promoted (2) The official language (vernaculars) in Thailand must be maintained for diversity (3) English and other foreign languages are to be promoted for economic development (4) Non-Thai workers are suggested to know Thai to receive social welfare (5) The language for disabled people will be developed systematically (6) Thai language for translation and interpretation will be standardized (Pathanasin & Jittasatian, 2020).

Regarding the utilization of ICC in English classrooms, ICC covers extensive aspects of communication and stresses the mediation of messages between people of diverse backgrounds without linguistic restraints and stereotyping (Byram et al., 2002). In this research, cultural content is included in English language lessons from both Western and Eastern contexts to build the student's understanding of the customs of English-speaking people from different parts of the world. Also, pluricultural and intercultural competence contain distinguishing factors, as pluricultural competence is primarily focused on skills rather than knowledge or attitudes. In addition, ICC helps learners behave appropriately and effectively with individuals who are culturally different. Michael Byram has stated that there are five components of intercultural communication which include knowledge of self and others, skills to relate to others, education (cultural awareness), skills to discover and interact, and attitudes presenting a clear framework to make ICC more comprehensible. A description of how to adopt this in activities and assessments in English as a foreign class is elaborated through Byram's and Deardorff's model of ICC. This article will review the methods of utilizing ICC in English as a foreign language in Thailand as the competitive nature of Thai education continues to prevent students from obtaining an enriching English language learning experience.

1.1 Research Problem

Research by Prasongporn, 2016 depicts that primary school students in Thailand use English for research, but cannot use it communicatively, while a large-scale snowball survey of secondary school students in various regions in Thailand portrays that most students view that English teaching is still exam-driven (Imsa-ard, 2020). Therefore, the

pedagogical obstacle is the method of incorporating intercultural communication to heuristically heighten the student's awareness of the advantages of obtaining good English language fluency in real-world applications, not merely for entrance to university.

Despite the educational hurdles that persist, the emergence of the Education Sandbox in Thailand is a prime example of how ICC can be included in English classrooms to reflect the background of multilingual students. The goals of the Education Sandbox based on the announcement on innovative school districts by the Ministry of Education include: (1) Focus on educational achievements and integral skills for students (2) Elevate the quality of education for underprivileged students to reduce inequality (3) Develop the curricula and assessment in schools to align with geographical and managerial contexts in varying provinces (4) Collaborate with the government to expand results. There are six provinces in the Education Sandbox including Satun, Kanchanaburi, Rayong, Srisaket, Pattani, Yala, Naratiwad, and Chiang Mai and the provinces have unique learning objectives. Examples of these goals include mother tongue-based education for ethnic minority groups and active learning approaches. Language education in schools in the Education Sandbox is considered a model to be adopted in Thai schools nationally (OBEC, 2019). Therefore, the researcher would like to present the English teaching methods in schools in the Education Sandbox as examples to aid interlocutors in their English fluency, relating the techniques to digital storytelling.

1.2 Research Questions

The research aims to study the utilization of digital storytelling in English as a foreign language classes for multilingual learners and to determine how intercultural communicative competence can be taught to address the following questions:

- 1) How can students learn English as a foreign language through digital storytelling?
- 2) What are activities that enhance intercultural communicative competence (ICC) for multilingual learners, and how can ICC be assessed?

1.3 Research Importance

The research is focused on highlighting communicative approaches in English as a foreign language instruction to develop the English teaching curricula in Thailand while correlating the hands-on integration of digital storytelling in the language learning process to meet the goals of building versatile skills in multilingual language learners. The research has the objective to render English teachers in Thailand practical resources on the methodologies of adapting task-based activities in English instruction and applying digital storytelling techniques that suit the sociocultural needs of the students.

1.4 Research Limitations

The rubric designed from the theoretical foundations of intercultural communicative competence (ICC) has not been implemented with Thai primary students, and English teachers without experience require guidance on choosing appropriate readings that would exemplify the student's ICC simultaneously with honing the student's English fluency.

2. Theoretical Background

The author approaches the literature by examining the language learning conditions of multilingual learners in Thailand, the relevant theories in intercultural communicative competence, and the implementation of digital storytelling in the context of English as a foreign language.

2.1 ICC in English as a Foreign Language

Cultural homogeneity is not valid by nature and it is only made possible through the exertion of power (Kanu, 2003, pp. 70-71). Thus, it is integral that interculturalism, inclusiveness, and interdisciplinary are perceived as key factors in ensuring that teaching does not exclude those who come from distinct ethnic backgrounds. Firstly, interculturalism is the blending of different cultures which promotes learning and connections between different cultural practices and reinforces the idea of equality of all cultures which brings the overlooked ethnic minority youth in the labor force, into the mainstream. Secondly, inclusiveness in teaching refers to the acknowledgment of the existence of the oppressed by recognizing their language, ethnicity, disability, class, sexual orientation, race, religion, and culture in the school curriculum which in turn would lead to the development of mutual respect, social responsibility, and critical thinking. Finally, interdisciplinary involves the understanding and amateur evaluation of cultural texts regardless of theories or existing opinions to encourage students to understand the contexts without the interference of biased criticism (Burney, 2012, pp. 202-204). A good curriculum requires the recognition of the student's background and English content which is applicable in their context and does not restrict students to speak and express themselves.

Students with ICC can gain pluricultural competence which predominantly highlights the skills rather than knowledge to shift from one language to another which is the ability to acknowledge language varieties, observe underlying meanings of words, mediate between individuals with no common language, exploit paralinguistics (non-verbal cues), and experiment with alternative ways of expression (Council of Europe, 2018).

In terms of foreign language education, the inclusion of cultural components is further emphasized after the establishment of the Common European Framework of Reference (CEFR) for Languages by the Council of Europe (Council of Europe, 2018). The CEFR's original goal was to instill communicative abilities in language learners across the European continent, regardless of cultural or linguistic limitations. Nonetheless, CEFR and national circular documents provide a general overview of ICC and not the details regarding the implementation of ICC (Reid, 2015, as cited in Reid, 2014; Europublic, 2006; Zerková, 2012; Kostková, 2012). As a result, teachers are left unguided on the particular context and technique in ICC to apply in the classroom. Thus, the teaching of ICC in foreign languages should be emphasized to heighten sociocultural awareness for learners. Through ICC, learners can see themselves as more than just imitators of the foreign language (Byram, 1997/2020, p. 34).

The approaches to consolidate intercultural communication in English language classrooms comprise cooperative learning, comparison method, cultural assimilation, cultural capsule, cultural island, reformulation, prediction, role-play, and treasure hunt (Reid, 2015). Previous studies with diverse bodies of learners such as university students in Lebanon prove the positive effect of cooperative learning through blog instruction in elevating intercultural communication among students. Cooperative learning creates less stress and increases tolerance for others (Awada & Gutiérrez-Colón, 2019). In the comparison method, students compare native and target cultures—for instance, the pros and cons between school systems and the ways to address individuals. For example, in Slovakia, it is expected for individuals to greet everyone with “Mr/Miss/Mrs,” titles even if they have similar ages, while in English society it is less formal (Kačmárová, 2008).

The technique of cultural assimilation involves the learner being introduced to situations that are often misunderstood like variations in the number of cheek kisses in different cultures. A type of teaching that portrays cultural assimilation is mother tongue-based multilingual education (MTB-MLE). With language learning techniques like MTB-MLE, multilingual storytellers are stimulated with a submerged learning experience in assimilation, immersion, transition (from mother tongue to foreign language), and maintenance of pluralism (Banker, 2006). An example of MTB-MLE for Shan (an ethnic minority group in Thailand) students is the Teams-Games-Tournaments conducted by an experienced English teacher who works with Shan students at a local school in Chiang Mai. Based on the researcher's personal interview with the teacher, the activity consists of 11 games wherein young students hold up vocabulary cards according to the teacher's instruction. Then, they practice hinting, miming, and matching English words on the board along with their peers to produce cooperative learning in a competitive but friendly atmosphere. The teaching aids include 80 English words and 37 Shan words with 7-8 words per category correlated to animals, the traditional Shan festival named Poi Sang Long, jobs, locations, food, and the body with magic prizes at the end of each game for the winning group (Supasan, 2022, pp. 26-35).

In the cultural capsule, the student's ICC is heightened through the comparisons between customs in different cultures, while similarly, the posters and artistic work of individuals from the target culture are presented in the classroom to evoke emotions within the students. When the teacher repeats stories to incidentally correct the student's words, it is called reformulation. Furthermore, in role-plays, new English vocabulary input occurs when students perform culturally relevant scenarios with the linguistic outcome to use oral commands and conduct presentations. To accentuate subconscious learning in the classroom, teachers can use the cultural island technique by including contemporary images of actors, singers, movies, and famous places that are attractive to students. Lastly, students can predict the content of an article or book through half-told stories via predictions and search for dates, events, and people in games in a treasure hunt which boost their intercultural communicative competence as a whole (Reid, 2015).

2.2 Assessment of Intercultural Communicative Competence

As stated earlier, Byram's five components of ICC or the five *savoirs*: knowledge of oneself and others, *savoir être* (intercultural attitudes and understanding towards otherness), *savoir s'engager* (the awareness or temperament to evaluate others and oneself), *savoir faire/apprendre* (interaction and skill to discover), and *savoir comprendre* (skills of interpretation and relation) are taken into consideration when customizing an ICC assessment for multilingual students. Byram has recommended setting objectives constituting that those with ICC are to be aware of the political and economic events of a country, to have the will and interest to engage with manifold groups of people in society, and to be ready to conduct appropriate behavior that is deemed acceptable in the foreigner's culture. A person's eagerness to discover other cultures is observed by the mediation of intercultural exchanges and the reasoning of other cultures and

one's own as well. Since a person's savoirs are holistic, visual illustrations can help learners convey their emotions clearly (Byram et al., 2002, p. 20), and the Likert scale by Oppenheim (1996) may be used to evaluate the learners' varying perspectives on a foreign culture when they express their ideas to measure performance in ICC (Oppenheim, 1996).

The ICC model was constructed to delineate the process orientation of intercultural communication among individuals. The model starts with respect, openness, and curiosity, followed by comprehension of cultural knowledge, the skills to observe, the desired internal outcome of adaptability and ethnorelativism (viewing one's culture in the context of other cultures), as well as the desired external outcome of effective communication (Deardorff, 2009, pp. 477-491). These theories are associated with ethnic minority communities and Thai nationals because of the interconnectedness of these individuals through language families and kinship. For example, Shan and Northern Thai descend from the Tai language root. Although Shan pronunciation and writing vary compared to Standard Thai, Shan people can understand the Thai language easily due to prevalent linguistic relationships (Mathias, 2016). In addition, Shan and Thai people practice Theravada Buddhism (Ramingwong, 2015).

In the initial step of the ICC formative assessment, students record the progress of their intercultural understanding in a culture log. The dimensions of ICC which are knowledge, skill, attitude, and awareness can be assessed by descriptors from novice to advanced within projects that involve speaking and listening (Lázár et al., 2007, p. 23-39). A wide array of studies highlight that the integration of cultural studies in English classrooms in project-based learning enhances both the student's communicative competence and worldly knowledge (Wang, 2005). In terms of language proficiency, it was historically assessed to determine the language learner's ability in meeting a specific language requirement (Valette, 1977, p. 6), but the learner's skills to compare, infer, and synthesize are recommended to be tested (Lázár et al., 2007). *Savoir être* is correlated to sentiments, cognition, and behaviors, and therefore evaluation is operated through questionnaires, culture logs, prompts, and gestural tasks (Dick et al., 2014). In *savoir comprendre* and *savoir faire*, it is recommended that students perform hands-on assignments that test their abilities to interact and relate in a set condition. *Savoir s'engager* can also be deduced by the student's performance of the skill in presentation skills, writing, group work, interviews, and oral and written activities (Fantini, 2009).

Adapting the components of ICC based on Byram's model (Byram, 1997/2020, p. 74) in Figure 1 and the performance descriptors by ACTFL, the researcher suggests a rubric that can guide teachers in assessing the ICC of multilingual students as depicted in Table 1 (ACTFL, 2012). The types of activities associated with each *savoir* are stated in Table 2.

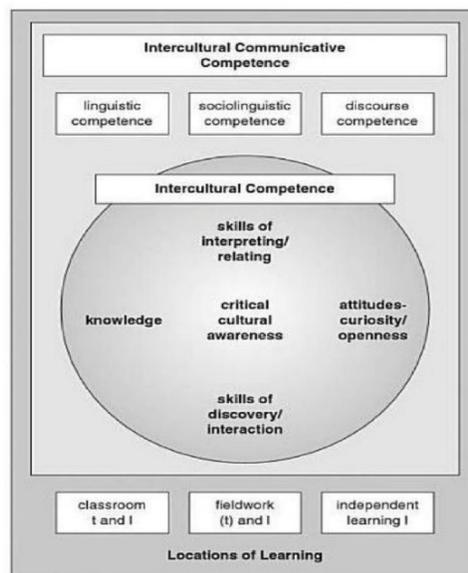


Figure 1. Byram's Model of Intercultural Communicative Competence

Table 1. The Intercultural Communicative Competence Rubric

ICC Component	Advanced (3)	Intermediate (2)	Novice (1)
Knowledge	The student has inclusive knowledge of facts in other cultures and can make comparisons between varying cultures based on the worksheet and culture logs. The student is also able to use synonyms and culturally appropriate content.	The student has a limited amount of knowledge of facts about other cultures and can vaguely make comparisons between varying cultures based on the worksheet and culture logs. The student can simplify answers and make certain references.	The student does not know any facts about other cultures and cannot make comparisons between varying cultures based on the worksheet and culture logs. The student's response appears memorized.
Skill (to relate and interact)	The student can interpret communication from other cultures and interact with ease.	The student can interact about familiar topics and partially interpret communication from other cultures.	The student uses model words or imitations to communicate and interact about other cultures.
Skill (to discover)	The student is eager to discover other cultures through frequent questioning and adequate descriptions of foreign ideals or discourse.	The student is somewhat interested to discover other cultures through occasional comprehension or inferences from their observation of other cultures.	The student has little to no interest in discovering other cultures and rarely asks questions or provides descriptions of foreign traditions.
Attitude	The student uses peer discussions to learn about Western and local cultures, as well as to provide unfair evaluations and opinions of others.	The student listens and learns about Western and local cultures, but he or she does not participate consistently enough to proceed to provide opinions and evaluations.	The student does not seem interested in learning about other cultures or making fair judgments.

Table 2. Utilization of ICC in the EFL Classroom

Period of instruction	ICC Component	Method of instruction
Before/after the course	Knowledge of others and the skill to discover	Writing a culture log and English vocabulary about what they learned about Western cultures and local customs of varying ethnic groups. Teachers promote the discussion of the similarities and differences between cultures
During the lesson	Attitude	Peer discussions/ interviews with the teacher
During the lesson	Skill to relate and interact	Group tasks
Twice after courses on Western and local Asian traditions	Awareness	Interview with the teacher

2.3 Digital Storytelling with ICC for Multilingual Students

By definition, digital storytelling is the process of utilizing multimodal media, social platforms, and technologies to narrate personal and educational accounts (Ohler, 2013). Robin (2006) describes that there are three types of storytelling comprising personal storytelling, historical storytelling, and educational storytelling and individuals choose the type of story they create depending on the purpose of their work which could be personal, informative, or persuasive (Robin, 2006). Digital storytelling agrees with the revised version of Bloom's taxonomy classifying the learning levels into six parts: to remember, understand, apply, analyze, evaluate, and create (Anderson et al., 2001, p. 31), compared to the original model which consists of knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom, 1956, p. 200). The digital storytelling process is in line with both the higher (to analyze) and lower

(to organize) skill sets in the updated model of Bloom's taxonomy, as learners of English can deeply enhance their English fluency through their resonance of plots and the identification of the story's main idea in a variety of modes (Ohler, 2013, p.25). An epitome that depicts the practicality of the utilization of digital storytelling is seen through the relocation of migrant children from varying areas in Myanmar. Ethnic minorities including Shan and Mon people who moved to Thailand to pursue work and study face a strong challenge in fully representing their traditional heritage through the process of assimilating into Thai culture after emigration and those without a strong cultural identity can become subsumed in Thai cultures. Also, migrant families from Myanmar are often stigmatized for being emigrants thus many struggle to work successfully in Thailand (Phaisantham, 2016, p. 30). Thus, it is advantageous that teachers create curricula that incorporate ethnic customs by allowing for self-directed learning and constant interaction between students and teachers, allowing students to conduct their academic research while drawing connections to their everyday lives through digital storytelling. Moreover, the "savoir components" of ICC are aligned with the Mangkhang (2021) learning process which is an area-based approach used for competency development utilized in the Education Sandbox Area in Chiang Mai, Thailand. The results show that both students and teachers are to follow four steps comprising (1) Awareness (2) Anticipation (3) Action (4) Reflection. In brief, the teacher's responsibility is to augment the student's awareness of the thesis of the subject so students, in turn, can understand the short-term and long-term effects of particular problems in their respective communities. The teachers would then design tasks for the students to seek information and critically reflect on their knowledge and become more aware of others (Mangkhang et al., 2021). Project-based approaches namely the open approach and place-based education to instruct diverse groups of students which boost the student's motivation to speak English and gain intercultural knowledge at the student's pace, engrossing the student's attention as they witness the practicality of learning about Western and Eastern cultures in a real-world context.

In correlation with the instruction of storytelling through literature, the open-approach teaching style provokes autodidactic learning in students through experiential activities. The seven steps of the open approach in the language classroom include (1) Introduction (2) Importation of language-related resources (3) Unfolding (4) Questioning (5) Problem-solving (6) Language Interaction (7) Collective synthesis and conclusion. An example of the application of the method is a situation wherein the teacher reiterates the relevance and significance of the stories the students studied in class so they recognize the linguistic beauty of their readings. Combinations of multimedia in the classroom build multisensory awareness as students would watch a reenactment of the story and recite the text. In the final assignment, students will create radio drama with feedback from their peers and assessed on their ability to communicate the language and story, as well as their deep understanding of Thai text (Asawatangtrakuldee et al., 2019, pp. 124-129).

Next, the creative narration of English content in classes is boosted by place-based education according to the location of the student's background. Place-based education entails that the local community and environment are the initial learning point for all subjects from language arts to scientific and mathematical fields (Sobel, 2004). This type of teaching increases ICC in students because they are immersed in the target language in the practical context and are able to investigate the usage of the English language from their domestic and geographic perspectives. Certain assignments that demonstrate place-based education are tasks for students to write short poems about their place of origin, or to describe the impact of settings in stories after viewing the illustrations (Lundahl, 2011). Therefore, digital storytelling has proven to help students establish cultural connections, incorporating multicultural and multilingual opportunities (Barreto, 2021, p. 52).

For instance, in the Where I'm From (WIF) project of Fitts and Gross (2010) with third graders, the results have shown that the utilization of multiple mediums of visualizations allowed all participants to verbalize their thoughts and identities. Participant A in the experiment made her views clearer with multicultural images, while another participant used translanguaging in poetry to showcase intricate social ideas in English and Spanish poetry which included smells, sounds, and emotions. Also, multilingual stories provide space for the lack of limitations in curriculum planning and allow students to further heighten their communication via the extensive connection with their school and community (Barreto, 2021, p. 11). Storytelling provides the opportunity for migrants to engage in the learning process unconsciously through stories that convey subtle messages. It has a positive impact on learners' interpersonal relationships and creates a sense of connectedness among the participants. The student's stories exhibit worldviews that aid English fluency, while simultaneously the narration improves their writing skills thus constant exposure to storytelling is conducive to language learning. Since ethnic minorities in Thailand are focused on learning Thai and English, digital storytelling is an advantageous way to feature an accessible and engaging learning experience.

Moreover, Hwang, Shadiev, Hsu, Huang, Hsu, and Lin (2016) investigated the effects of storytelling through web-based multimedia on the English speaking skills of elementary school students after the implementation of technological aids to facilitate language learning with 30 students in the experimental group and 29 in the control

group. Students were immersed in the Story Editor and Story Player function in the NetBeans Platform. The findings from the pre-test and post-test assessing the student's accent, grammar, vocabulary, fluency, and comprehension indicated that students who used Web-based multimedia systems for creating their stories dramatically outperformed their counterparts in the control group. This suggests that the storytelling activity was beneficial for improving English speaking skills as the students were able to connect their identities to characters in stories, and implicitly learn English in the process. The interview of the students in the experimental group post-teaching uncovered that there is an outstanding association between animated stories and increased vocabulary retention, and students enjoyed working independently to avoid distractions (Hwang et al., 2016).

2.4 Utilization of Digital Storytelling in EFL

The process to implement digital storytelling is conducted in three stages. In preparation, students develop a plan through the generation of concept maps, storyboards, and a script for narration. The storyboards can be easily constructed using free platforms such as formatting of slides on Microsoft Powerpoint, Microsoft Word, and Storyboard Pro (Atomic Learning). In the primary step, the student receives a formative assessment rubric from the teacher to guide them on this procedure. Next, the production phase is completed after the arrangement of the storyboard and the script. Finally, students present their work to their teacher and peers, and they have the liberty to select the mode of presentation of their digital stories such as a video, slide show, ePortfolios, and scrap blogs (Frazel, 2010, pp. 21-23, 42-47). Regarding story design, students should be informed about the elements of telling a good digital story comprising a point of view, a dramatic question, emotional content, voice projection, soundtrack, economy (using sufficient content), and pacing (Center for Digital Storytelling, 2013). A compelling way to narrate a story is demonstrated in the “Visual Portrait of a Story” as guided by digital humanist, Jason Ohler. This process initially starts from the beginning (call to adventure), problem (tension), middle (conflict), solution (resolution), and end (closure, learning) (Ohler, 2013). The elements of a beginning introduce information regarding the life of the character and a quest that needs to be accomplished in the rising arc. Then, it is followed by problems encountered by the character which can be overcome through an internal or personal transformation of an attitude shift, or solutions that answered questions and accomplished goals. The ending point is called closure or the ending summarizes the lessons learned or provides a resolution of the goals (Ohler, 2013, pp. 105-111). Figure 2 represents an illustration that outlines an example of the visual portrait of a story that occurred with characters from Chapter 8 in *Around the World in 80 Days* working towards finding a solution to their issue via the teaching of prepositions and travels in a secondary English class for Thai and ethnic minority students. The book is chosen due to the multicultural theme of global travel in which the main characters, Phileas Fogg and Passepartout, encounter foreign traditions and customs (Verne et al., 2020). Digital storytelling follows the concept of constructivism which is the theory stating that learners construct knowledge rather than just passively receive information (Piaget & Cook, 1952). As people experience the world and reflect upon their circumstances, they build their representations and incorporate new information into their pre-existing knowledge because students can produce digitized stories through adaptation and assimilation, and it also illustrates that they learn to use video-making tools such as Windows Movie Maker and Adobe Spark (Karantalis & Koukopoulos, 2022).

The employment of digital storytelling to develop ICC can be elaborated by the term “multiliteracies” which rose to prominence in the New London Group (1996) intending to abide by the new practices in the professional and personal lives of individuals. Through multiliteracies, the “command-and-control” strategy is taken over by “horizontal relationships of teamwork” as people are expected to not only be monocultural and monolingual, but to be multi-skilled in their association of cultural and linguistic diversity in a global perspective (New London Group, 1996). The utilization of modern technologies and the emphasis on social relationships entail that people need to become literate in different modes of language use such as distinguishing the causal interaction between friends via e-mails from the exchange with a manager. Evidently, technology has highlighted the multimodality of the English language discourse that occurs in gestural, verbal, and written forms (Olthouse, 2013). The visual portrait of a story portrays that stories contain multiple stages, and teaching with multimodality involves meaning-making in social semiotics, visual signs, and a selection of words (Kress, 2011, pp. 35-47) reflecting tangible scenarios which are denoted by story maps and the usage of varied content and narration (Ohler, 2013). Hence, the amalgamation of Western and Eastern stories encompasses transcultural identities that are exercised through critical discourse analysis. The objective of teaching English as a foreign language with digital storytelling is for students to pinpoint and evaluate the role of the stories' narrative, and plan the structure and content of the story while considering how the narratives function together with a combination of modes such as images, voiceover, and music.

As multilingual learners possess insights about being part of a community that goes beyond nation-state boundaries, transnational literacies can thus allow them to understand local, national, and global issues, and engage with

individuals who mostly come from underprivileged backgrounds with empathy and sensitivity (Darvin & Norton, 2014). Therefore, the construction of digital stories enhances EFL learners' collaborative skills as pupils can discuss language usage with their peers, resolve language difficulties, share their stories, and interact with the users online. All in all, digital storytelling correlates to ICC because it boosts the flow of communication through creative games and utilizes autodidacticism with teachers' guidance and feedback in various activities when needed.

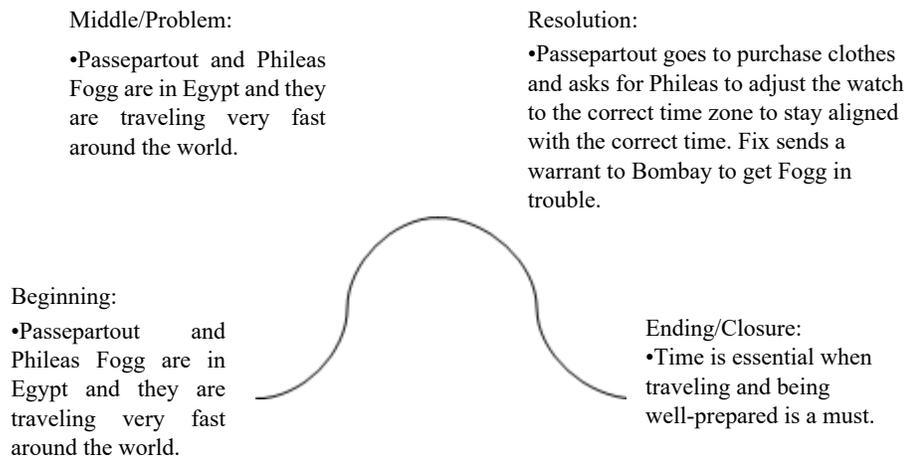


Figure 2. Visual Portrait of a Story

3. Methodology

The researcher employed a traditional literature review of over 50 reputable journals, websites, and books on the theoretical foundations of intercultural communicative competence (ICC) and evaluated the procedure of designing digital stories in the classroom for English as a foreign language classes. After a critical analysis of the components of ICC, the researcher created a rubric to guide teachers in assessing the student's English level alongside their ICC. The rubric was considered valid and functional with the English teaching curriculum by three educational specialists.

4. Results

1) How can students learn English as a foreign language through digital storytelling?

Students who are learning English as a foreign language can elevate their English language fluency through their immersion in multicultural stories comprising pictures and provoking text about their current environment and global views. The student's self-learning of digital story production instigate the accommodation of new English vocabulary, and students can follow the guideline of the components of a solid story from Ohler's visual portrait of a story (2013). The teacher plays a key role in developing prompts that elicit formal or informal narration, supporting students to use technological tools, and motivating them with constructive feedback.

2) What are activities that enhance intercultural communicative competence (ICC) for multilingual learners and how can ICC be assessed?

Depending on the English language level of the students, the activities that enhance ICC for multilingual learners range from blog writing assignments about cultural excerpts covered in the classroom, ongoing peer discussions, video editing on online platforms, to one-on-one interviews. ICC can be assessed with a rubric that focuses on the objective for learners to obtain heuristic abilities. The criteria are that the language learner is not only informed about others, but they are also eager to discover and become aware of foreign cultures based on Byram's ICC model (Byram, 1997/2020, pp. 55-57). When successful, the multilingual learner would be capable of obtaining a sociocultural aptitude while organically learning English in the process.

5. Conclusion

Overall, it is significant not to overlook the overriding issues that prolong the subcultural differentiation of multilingual learners such as the economic structure that impedes migrant families from pursuing better-paying occupations. Furthermore, language teachers are encouraged to develop a framework for English as a foreign language with ICC

that reflects the underpinnings of the student's diverse background through competency-based curricula that embrace flexible and creative teaching tactics while avoiding a purely exam-based approach. Methods including place-based education and the open approach provide a space for learners to gain ICC with multiple intelligences, as students become intelligent through problem-solving with local and global awareness of their surroundings (Gardner, 1983, p. 81), presented in interpersonal group work. Through the comprehension of intercultural stories in a variety of digitized formats, students would be submerged in the English language by relating to the stories told in class, and transition from their mother tongue to English when they witness their capacity to contribute to games. In turn, students organically develop their English language skills through pluralistic ideals (Banker, 2006). Ultimately, the sustainable solution lies in the executive policies that enforce culturally responsible pedagogy for multilingual students and increased funding for diversity and teacher training for English teachers on ICC.

Acknowledgments

This study would not have been possible without the assistance and support of the academic advisors of the researcher and numerous people, to whom the researcher expresses her heartfelt gratitude. She would also like to express her gratitude to Chiang Mai University for granting her a CMU Presidential Scholarship for her graduate studies.

References

- Academic Focus Education Sandbox. (2019). *Office of the Basic Education Commission*. Retrieved from <https://dl.parliament.go.th/handle/lirt/548822>
- Anderson, L. W., Wittrock, M. C., Raths, J., Pintrich, P. R., Mayer, R. E., Cruikshank, K. A., Airasian, P. W., & Krathwohl, D. R. (2001). *A taxonomy for learning, teaching, and assessing: A revision of Bloom's*. Addison Wesley Longman, Inc.
- Asawatangtrakuldee, N., Jindapan, J., & Thongphubut, T. (2019). An Application of the Open Approach Teaching for Thai Literature to Access to Values of Literature and Aesthetic of Thai Language: A Case Study of Grade 6 Students. *Plearnpattana School, I*, 121-133. Retrieved from https://so05.tci-thaijo.org/index.php/edjour_stou/article/view/191749/140941 (in Thai)
- Awada, G., & Gutiérrez-Colón, M. (2019). Effect of cooperative learning instruction and blogs on apprehension of Intercultural Communication. *Journal of Educational Technology Systems*, 48(1), 72-96. <https://doi.org/10.1177/0047239519838217>
- Banker, C. (2006). *Foundation of bilingual education and bilingualism*. Multilingual Matters LTD: Bristol.
- Barreto, Jennifer Michelle. (2021). *"Be Valiente": Investigating Ethnic Identity through Digital Storytelling with Latinx Fourth-Grade Students*. Graduate Theses and Dissertations. Retrieved from <https://digitalcommons.usf.edu/etd/9068>
- Bennett, J. M. (2008). Transformative training: Designing programs for culture learning. In M. A. Moodian (Ed.), *Contemporary leadership and intercultural competence: Understanding and utilizing cultural diversity to build successful organizations*. Thousand Oaks, CA: Sage. 95-110
- Bloom, B. S. (1956). *Taxonomy of Educational Objectives, Handbook I: The Cognitive Domain*. New York: David McKay Co Inc.
- Bowles, S., & Gintis, H. (2011). *Schooling in capitalist America: Educational reform and the contradictions of economic life*. Chicago: Haymarket Books.
- Burney, S. (2012). *Pedagogy of the Other: Edward Said, Postcolonial theory, and Strategies for Critique*. New York: Peter Lang Publishing.
- Byram, M. (2020). *Teaching and assessing intercultural communicative competence* (8th ed.). Multilingual Matters. <https://doi.org/10.21832/byram0244>
- Byram, M., Gribkova, B., & Starkey, H. (2002). *Developing the intercultural dimension in language teaching: A practical introduction for teachers*. Council of Europe.
- Cheewasukthaworn, K., & Suwanarak, K. (2017). Exploring Thai EFL Teachers' Perceptions of How Intercultural Communicative Competence Is Important for Their Students. *PASAA*, 177-204. Retrieved from <https://www.culi.chula.ac.th/publicationonline/files/article/DECY3mAx5hMon110559.pdf>
- Child Rights Resource Center. (2016). *Education for All in action in Thailand: A case study of good practice*. Save the

- Children. Bangkok: Save the Children in Thailand, 1-5. Retrieved from https://resourcecentre.savethechildren.net/pdf/education_for_all_in_action_in_thailand_eng_resized.pdf/
- Council of Europe. (2018). *Common European Framework of Reference for Languages: Learning, Teaching, Assessment. Companion Volume with New Descriptors*. Strasbourg: Council of Europe, 28. Retrieved from <https://rm.coe.int/cefr-companion-volume-with-new-descriptors-2018/1680787989>
- Darvin, R., & Norton, B. (2014). Transnational Identity and Migrant Language Learners: The Promise of Digital Storytelling. *Education Matters: The Journal of Teaching and Learning*, 2(1), 55-66. Retrieved from <https://journalhosting.ualgary.ca/index.php/em/article/view/62890>
- Deardorff, D. K. (2009). Implementing intercultural competence assessment. In D. K. Deardorff (Ed.), *The SAGE handbook of intercultural competence*. Thousand Oaks, CA: S.
- Dick, W., Carey, L. & Carey, J. O. (2014). *The systematic design of instruction*. Essex, UK: Pearson.
- EF English Proficiency Index. (2021). EF Education First - Educational Tours & Language Programs Abroad. Retrieved from <https://www.ef.com/wwen/epi/regions/asia/thailand/>
- Ethnic Minority Groups in Thailand: The Research and Challenges*. (2021). Thailand Science Research and Innovation. Retrieved from tdri.or.th/dl/548/กลุ่มชาติพันธุ์ในประเทศไทย-งานวิจัยและความท้าทาย [ethnic minorities in Thailand-research and challenges].
- Europublic (2006). Europublic languages and cultures in Europe (LACE): The Intercultural Competences Developed in Compulsory Foreign Language Education in the European Union. Retrieved from [https://nellip.pixel-online.org/files/publications_PLL/18_Languages%20and%20Cultures%20in%20Europe%20\(LACE\).pdf](https://nellip.pixel-online.org/files/publications_PLL/18_Languages%20and%20Cultures%20in%20Europe%20(LACE).pdf)
- Fantini, A. (2009). Implementing intercultural competence assessment. In D. K. Deardorff (Ed.), *The SAGE handbook of intercultural competence*, 464. Thousand Oaks, CA: S.
- Fitts, S., & Gross, L. A. (2010). I am from delicious lasagna: Exploring cultural identity with digital storytelling. *Social Studies and the Young Learner*, 23(1), 8-10. Retrieved from https://www.socialstudies.org/system/files/publications/articles/yl_230108.pdf
- Frazel, M. (2010). *Digital Storytelling Guide for Educators*. ISTE.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York, NY: Basic Books.
- Gunther Kress. (16 Nov 2011). Multimodal discourse analysis from: *The Routledge Handbook of Discourse Analysis* Routledge. Retrieved from <https://www.routledgehandbooks.com/doi/10.4324/9780203809068.ch3>
- Hwang, W.-Y., Shadiev, R., Hsu, J.-L., Huang, Y.-M., Hsu, G.-L., & Lin, Y.-C. (2016). Effects of storytelling to facilitate EFL speaking using web-based multimedia system. *Computer Assisted Language Learning*, 29(2), 215-241. <https://doi.org/10.1080/09588221.2014.927367>
- Hymes, D. (1972). On communicative competence. In J.B. Pride and J. Holmes (Eds.), *Sociolinguistics*. Harmondsworth: Penguin.
- Imsa-ard, P. (2020). Motivation and Attitudes towards English Language Learning in Thailand: A Large-Scale Survey of Secondary School Students. *Reflections*, 27(2), 140-161. Retrieved from <https://eric.ed.gov/?id=EJ1283491>
- Iwai, Y. (2011). The Effects of Metacognitive Reading Strategies: Pedagogical Implications for EFL/ESL Teachers. *The Reading Matrix*, 11(2), 150-159. Retrieved from http://www.readingmatrix.com/articles/april_2011/iwai.pdf
- Kačmárová, A. (2008). Intercultural Communication from a Slovak Speaker's View. *Discourse and Interaction*, 1(1), 69. <https://core.ac.uk/download/pdf/230621124.pdf>
- Kanu, Y. (2003). *Curriculum as Cultural Practice: Postcolonial Imagination*, 1(1). <https://doi.org/10.3138/9781442686267>
- Karantalis, N., & Koukopoulos, D. (2022). Utilizing digital storytelling as a tool for teaching literature through constructivist learning theory. *SN Social Sciences*, 2, 1-19. <https://doi.org/10.1007/s43545-022-00412-w>
- Kieffer, M. (2020, June 30). *The Obscured Progress of Multilingual Learners*. NYU Steinhardt. Retrieved from <https://steinhardt.nyu.edu/ihdsc/on-the-ground/obscured-progress-multilingual-learners>
- Kostková, K. (2012). *Rozvoj interkulturní komunikační kompetence* [Development of intercultural communication competence]. Brno: Masarykova univerzita. Retrieved from

- https://www.researchgate.net/profile/Klara-Ulicna/publication/312041056_Rozvoj_interkulturni_komunikacni_kompetence/links/586b13008ae6eb871bb6ec5/Rozvoj-interkulturni-komunikacni-kompetence.pdf
- Kwon, Y. (2017). A Study of Thai Teachers' Perceptions toward the Implementation of Communicative Language Teaching of English. *HRD Journal*, 8(1), 119-121. Retrieved from http://hrdjournal.buu.ac.th/public/backend/upload/onlinejournal/file/31082017_150414449214437800.pdf
- Lázár, I., Huber-Kriegler, M., Lussier, D., Matei, G. S., Peck, C. (2007). *Developing and Assessing Intercultural Communicative Competence: A Guide for Language Teachers and Teacher Educators*. Strasbourg and Graz: European Centre for Modern Languages and Council of Europe Publishing.
- Liton, H. A. (2016). Adopting Intercultural Communication Issue in Teaching English. *Lingua Cultura*, 10(1), 1-6. <https://doi.org/10.21512/lc.v10i1.910>
- Lundahl, M. (2011). Teaching Where We Are: Place-Based Language Arts. *The English Journal*, 100(3), 44-48. Retrieved from https://www.jstor.org/stable/25790060#metadata_info_tab_contents
- Mangkhang, C., Yimsawat, C., Nettip, A., & Kaewpanya, N. (2021). Area-based learning approach to the competency development of Social Studies pre-service teachers in the Chiang Mai Education Sandbox area, Thailand. *Journal of Education and e-Learning Research*, 8(3), 264-271. <https://doi.org/10.20448/journal.509.2021.83.264.271>
- Mathias, J. (2016). Tai identity in Myanmar and beyond. *IIAS the Newsletter*, 75, 32-33. Retrieved from https://www.iias.asia/sites/iias/files/nwl_article/2019-05/IAS_NL75_3233.pdf
- Ministry of Labour. (2020, August 19). *Minimum wage*. Retrieved 3 October, 2021 from <https://www.mol.go.th/en/minimum-wage>.
- Mishra, S. (2013). Educational significance of conflict theory. *Pedagogy of Learning (POL) an International Journal of Education*, 1(1), 25-31.
- New London Group. (1996). A pedagogy of multiliteracies: Designing social futures. *Harvard Educational Review*, 66, 60-92.
- Ninchan, R. (2020). The Negotiation Strategies for the Rights of Migrant Workers in Chiang Mai, 33(3), 55-69.
- Ohler, J. (2013). *Digital Storytelling in the classroom: New Media Pathways to literacy, learning, and creativity*. Corwin Press.
- Olthouse, M. J. (2013). Multiliteracies theory and gifted education: Creating "smart spaces" in language arts classroom. *Gifted Child Today*, 36(4), 247-253. <https://doi:10.1177/1076217513497575>.
- Omer, S., & Jabeen, S. (2016). Exploring Karl Marx conflict theory in education: Are Pakistani private schools maintaining status quo? *Bulletin of Education and Research*, 38(2), 195-202.
- Oppenheim, A. N. (1996). Questionnaire design, interviewing and Attitude Measurement. *Continuum*.
- Pathanasin, S., & Sureerat, J. (2020). Toward a Language Education Policy for Immigrants in Thailand: Lessons Learnt from Europe and Canada with a Case Study of Phuket Island. *ASIAN REVIEW*, 33(1), 3-23. Retrieved from <https://so01.tci-thaijo.org/index.php/arv/article/view/243597>
- Phaisantham, C. (2016). *Education Pathway for Shan Migrant Children in the City of Chiang Mai* (thesis). Thammasat University. Retrieved from http://ethesisarchive.library.tu.ac.th/thesis/2016/TU_2016_5605036085_5946_6084.pdf (in Thai)
- Pholphirul, P., & Rukumnuyakit, P. (2010). Economic contribution of migrant workers to Thailand. *International Migration*, 48(5), 174-202. <https://doi.org/10.1111/j.1468-2435.2009.00553.x>
- Piaget, J., & Cook, M. T. (1952). *The origins of intelligence in children*. New York, NY: International University Press.
- Poyatos, F. (1992). Non-verbal communication in foreign language teaching: Theoretical and methodological perspectives. In A. Helbo (Ed.), *Evaluation and Language Teaching*. Bern: Peter Lang.
- Prasongporn, P. (2016). *English Education at Primary Level in Thailand*. National Institute for Educational Policy Research. Retrieved from https://www.nier.go.jp/06_jigyos/symposium/i_sympo27/pdf/E03.pdf
- Ramingwong, P. (2015). "Living in between": The distinctive position of Shan migrants in Thailand. *Journal of Interdisciplinary Research: Graduate Studies*, 4(4), 1-6.
- Reid, E. (2014). *Intercultural Aspects in Teaching English at Primary Schools*. Frankfurt am Main: Peter Lang.

- Reid, E. (2015). Techniques developing intercultural communicative competences in English language lessons. *Procedia-Social and Behavioral Sciences*, 186, 939-943. <https://doi.org/10.1016/j.sbspro.2015.04.011>
- Robin, B. R. (2006). *The Educational Uses of Digital Storytelling*. Retrieved from <https://digitalstorytelling.coe.uh.edu/articles/Educ-Uses-DS.pdf>
- Sobel, D. (2004). *Place-based education: connecting classrooms & communities*. Great Barrington, MA. Orion.
- Supasan, K. (2022). *Mother Tongue-Based Learning Innovation Integrated with Team- Games-Tournament and English-Tai Teaching Aids to Develop English Vocabulary Recognition of Ethnic Tai Students, Chiang Mai Province* [Unpublished doctoral dissertation/master's thesis]. Chiang Mai University. (in Thai)
- Thanarachataphoom, T. (2020). The utilization of ordinary national educational test score. *Journal of Education Studies*, 48(1), 63-82.
- The 7 Elements of Storytelling*. (2013). University of Houston. Retrieved from <http://digitalstorytelling.coe.uh.edu/archive/7elements.html>
- The American Council on the Teaching of Foreign Languages (ACTFL). (2012). *Performance Descriptors for Language Learners*. Retrieved from https://www.actfl.org/sites/default/files/publications/ACTFLPerformance_Descriptors.pdf
- The Ministry of Education. (2008). *The Basic Education Core Curriculum B.E. 2551 (A.D. 2008)*. Office of the Basic Education Commission. Retrieved from http://academic.obec.go.th/images/document/1525235513_d_1.pdf
- UNICEF. (2016). (rep.). *Bridge to a Brighter Future: Bilingual–Multilingual Education Program (Thai-Malay Malay) in schools in the Southern border provinces*. Retrieved from [https://www.unicef.org/thailand/media/1296/file/รายงาน%20สะพานเชื่อมใจไปสู่อนาคตอันสดใส%20\(รายงานฉบับย่อ\).pdf](https://www.unicef.org/thailand/media/1296/file/รายงาน%20สะพานเชื่อมใจไปสู่อนาคตอันสดใส%20(รายงานฉบับย่อ).pdf) [Bridge to a Brighter Future (summarized report)]-
- Valette, R. M. (1977). *Modern Language Testing*. New York: Harcourt Brace Jovanovich.
- Verne, J., Glencross, M., & Aldiss, B. W. (2020). *Around the world in Eighty Days*. Penguin Classics, an imprint of Penguin Books.
- Wang, Z. Y. (2005). *An English teaching for the purpose of cross-cultural communication-systemic functional grammar and language teaching*. Beijing Language and Cultural University Press.
- Winichakul, T. (2017). Kon Thai Kon Ern. (In Thai) [The Other Thai]. *Nonthaburi: Fa Dieuw Kan Publishing*, 24, 151-155.
- Wu-Yuin, H., Rustam, S., Jung-Lung, H., Yueh-Min, H., Guo-Liang, H., & Yi-Chun, L. (2016). Effects of storytelling to facilitate EFL speaking using Web-based multimedia system. *Computer Assisted Language Learning*, 29(2), 215-241. <https://doi.org/10.1080/09588221.2014.927367>
- Zerzová J. (2012). *Interkulturní komunikační kompetence a její rozvíjení v hodinách anglického jazyka na 2. Stupni ZŠ* [Intercultural communication competence and its development in English language classes in the 2nd grade of an elementary school]. Masarykova univerzita, Brno. Retrieved from <https://is.muni.cz/do/rect/nakladatelstvi/publikace/210-6824/210-6824-ebook.pdf>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).