Developing Student Creative Problem-Solving Skills (CPSS) Using Online Digital Storytelling: A Training Course Development Method

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Nipaporn Khamcharoen, Thiyaporn Kantathanawat(✉), Aukkapong Sukkamart
King Mongkut's Institute of Technology Ladkrabang (KMITL), Bangkok, Thailand
thiyaporn.ka@kmitl.ac.th

Abstract—This study set out to research and evaluate the needs in developing creative problem-solving skills (CPSS) of undergraduate students through developing and evaluating a digital storytelling process using Padlet. The sampling process used simple random sampling to select 332 teachers from 83 schools in Bangkok. The data was collected using a needs assessment questionnaire, training course questionnaire, and satisfaction questionnaire. Descriptive statistics used for the analysis included frequency, percentage, mean ($\bar{x}$), and standard deviation (SD). The data collected were mean scores of expert validity testing and student inter-rater reliability testing. The assessment evaluated student satisfaction toward the CPSS training course using 30 students in the Computer Education Program at Dhonburi Rajabhat University's Faculty of Education in Thailand. The findings revealed that of the four aspects identified for developing undergraduate CPSS, *elaboration* was at the top of the priority of needs ($PNI_{Modified}$ = 0.20). This was followed by *originality* and *flexibility* ($PNI_{Modified}$ = 0.19). Finally, was *fluency* ($PNI_{Modified}$ = 0.18). Also, analysis of the *prospective condition* was ranked 'high' across all four aspects with an average of $\bar{x}$ = 4.38 SD = 0.06. Further analysis of the *real condition* showed that all four aspects had an average of $\bar{x}$ = 3.67, SD = 0.06. The study contributes to the literature in that it demonstrated that correctly developed and implemented undergraduate student CPSS can increase significantly. This fact is critical in knowing as a nation's future depends on its workforce and leaders having CPSS.

Keywords—creativity, critical thinking, higher-order thinking skills, needs assessment, Thailand

1 Introduction

Teaching in the 21st century aims for students to embrace critical thinking skills (CTS), creativity, self-confidence, knowledge acquisition, understanding of one's self knowledge-construction. Students should also learn to be entrepreneurs and producers who strive for excellence, patience, diligence, teamwork, social responsibility, social consciousness, virtue, peace, and Thainess [1]. Learning design must not be class simulations but instead provide scenarios as close to real-life based on the learning context

or environment. Therefore, learning situations should be based on an environment that the learner is familiar with and knows about.

New experiences should be accumulated to challenge old beliefs or values, causing individuals to abandon their old beliefs and search for new answers. In Kuhn's description concerning how paradigms are created and what they contribute to scientific or disciplined inquiry [2], the author says that all research's foundation is based on scientific achievements from the past and that these achievements can be referred to as 'paradigms.' Therefore, education paradigms become critical as they are the lens through which students view their environments. Unfortunately, new paradigms can also provide the catalyst for education reform resistance [3].

In *active learning*, student learning is placed at the center, focusing on '*how*' students learn, not just the '*what*' of learning [4], [5]. Students should also be taught how to '*think hard*,' challenging what they learn rather than passively receiving information from the teacher.

Also, self-knowledge creation is based on student collaboration and classroom activities, whose beginnings lie in *constructivist-inspired thinking* (CIT) [6]. CIT further instills knowledge acquisition through student involvement with the course content (such as in flipped and blended learning) instead of repetition and memorization [7].

Another component goal in learning has been training students to acquire *21st – century skills* [8]. These include teaching how to *think critically* [9]-[13], how to be *creative*, [14]-[17], *problem solving* [10], [11], [18] and how to acquire *higher-order thinking skills* (HOTS) [19], [20].

Furthermore, research concerning university course success has identified '*habits of mind*' being essential. These include analyzing information, reasoning, interpretation, accuracy, precision, and problem-solving [18]. Also, workers in a 21st-century workforce must have the ability to think critically when they compare evidence, evaluate competing claims, and make reasonable deductions [21]. Other research points to the need for 21st-century workers to have the ability for innovation and CTS and active citizenship [22], [23].

Problem-solving skills (PSS) have also been identified in numerous studies as a prerequisite for employment for 21st-century workers [24]. In Vietnam, a World Bank report specifically identified worker cognitive skill problems in both PSS and CTS [25]. This is consistent with a study from the US-based National Association of Colleges and Employers (NACE), in which employers indicated that CTS and PSS were ranked second in importance by 96.3% of the respondents [10]. These findings are also consistent with another OECD/UNESCO report on Thailand's education policy in which it concluded that information communications technology (ICT) could play an essential role in supporting and creating innovative teaching practices and learning environments for supporting students' 21st-century competencies such as PSS and CTS [11].

In support of CTS, another report has found that a series of drills exercises can teach these skills and problem solving [26]. It has also been suggested that the outcome of cognitive development is thinking [27]. Therefore, education's purpose is not to impart knowledge but to facilitate a student's PSS and thinking processes [28].

Various teaching methods have been discussed and explored for teaching students 21st-century skills. One frequently evaluated method is *inquiry-based learn*ing (IBL),

which allows students to explore, inquire, and examine knowledge that can enhance their PSS. The teacher becomes the facilitator or actor who motivates students' inquiry, solution, and individually derived conclusions [29], [30].

Closely related is *student-centered learning* (SCL), which has also become a crucial foundation in teaching 21st-century skills [31], where educators serve more as facilitators than teachers [32]. Education policies also need to focus on teacher competency development [33], as pre-service teachers are on the frontlines in training the innovators and leaders of tomorrow's workforce, which require 21st Century workforce skills [34].

Therefore, there is an emphasis on 21st-century workers who are highly skilled in learning and adapting and have the knowledge that can be linked to other subjects in work innovation. CPSS is also directly related to improving the quality of life [15], creative thinking, and applying knowledge theory to create processes and production methods that create innovation beneficial to individuals and society. In addition, in terms of learning skills and innovation, CPSS are also essential in encouraging students to develop CTA, PSS, communications, innovation, cooperation, and creativity [35]. These skills are aimed at learners who want to modify the way they learn and build their own body of knowledge. Finally, from the PISA (Program for International Student Assessment) assessment tests, CPSS is stated to be in high demand in organizations experiencing fast growth and needing technical and highly-skilled managerial professionals [36].

In addition, creative thinking processes are techniques used in advanced human thinking and innovation to produce new things or gain strategic advantages. Additionally, these skills are necessary at work and can be adapted to everyday daily living. Therefore, educators must be aware of developing student creative thinking and CPSS and how to support each student's different-yet-unique creative thinking [15], [37].

Furthermore, it has been found that US employment growth has originated in new firms and organizations which have introduced new innovative practices, services, and products [24]. Unfortunately, engineering students seldom develop designs that respond to real human problems [24]. However, according to the OECD, innovation is crucial for growth [38].

As we have seen, ICT plays a fundamental and essential role in CPSS development. As the technology has evolved and the Internet access bandwidth has increased, prices have decreased. This has allowed nearly universal access in some developing nations such as Thailand to very affordable digital education tools and learning platforms for both students and teachers. Moreover, digital mobile learning and its use in a problem-based learning (PBL) environment as a cognitive tool to promote HOTS [19], [20].

In this new environment, digital storytelling has become recognized as a valuable tool in teaching analytical thinking and HOTS [39]-[44]. Digital storytelling is a multi-media process using integrated creator voice-overs through digital technologies. Also, although a 21st-century innovation, it is not that far removed from the ancient technique and oral traditions used for millennium [45].

Moreover, new digital software-as-a-service cloud-based tools such as Padlet allow real-time hosting and student collaboration by uploading, organizing, and sharing unique content to virtual bulletin boards called '*padlets*' [46]. When digital storytelling is combined with a digital tool such as Padlet, teachers can insert questions into each

step of a story's progression. This allows the digital story to reinforce a student's thinking, analysis, and synthesis skills as the story transforms.

From what has been discussed, it can be seen that these skills, ICT, and digital tools are crucial in 21st-century education. It is especially essential in developing CPSS, as CPSS is critical for teachers' need in developing and equipping students to enter society and its workforce.

However, it has been pointed out in multiple Thai educator studies that many problems stand in the way of transforming students into 21st-century workforce members. One of the problems is the competency readiness of primary education teachers [47], another is the continued use of 'chalk and talk' and teacher-centered teaching. Another is the inability of many teachers to keep up with the pace of change [47], and finally, the lack of teacher motivation in many.

Therefore, solutions must be sought. The complex pot of problems is the COVID-19 pandemic and the havoc created for the Thai education system and its students and teachers. Under Thailand's '*New Normal*,' online teaching has now become the required and accepted practice, but not without numerous bumps in the road. Therefore, this study investigates how a traditional and accepted method for learning and teaching (storytelling) can be adopted in a new digital educational environment while developing critically needed CPSS.

2 Objectives of the research

1. The study's objectives include determining and prioritizing needs in developing undergraduate student CPSS.
2. To develop a CPSS training course using a digital storytelling process.
3. To evaluate student satisfaction concerning their participation and use, the author developed a CPSS training course using a digital storytelling process.

3 Research methods

This research collected quantitative data, and the details are described below.

3.1 Ethics clearance

Prior to the study's commencement, the study project plan was detailed to our university's ethics overview committee. After, the two groups of experts, the sample questionnaire group and the CPSS evaluation group of undergraduate students, were informed that their input and personal information was confidential [17].

3.2 Population and sample group

The study's population included 104 schools and teachers in the Bangkok metropolitan area. Simple random sampling was used in February 2020 to select 83 schools from

which four questionnaires were sent to each school. Sample size determination used the commonly accepted questionnaire to observed variable ratio of 20:1 [48], [49].

Questionnaire collection was 100% successful due to the authors' Faculty of Education having student teachers assigned to practice in the target schools. Therefore, the student teachers were asked to bring the questionnaire to the teachers in the schools and asked for their assistance in the distribution and collection. Therefore, the information was 100% complete.

3.3 Research tools

The CPSS questionnaire developed for the sample group of 332 teachers consisted of two parts. Part 1 contained four general information items concerning each teacher, while Part 2 contained 16 items on the needs in developing CPSS. Each item used a five-level Likert agreement scale whose anchor points were 5 (highest) and 1 (very low) (Table 1).

After its design, the questionnaire's accuracy, consistency, and content validity were undertaken. These items were accomplished using multiple processes [50]. The first was to use a panel of five education experts to assess each questionnaire items' validity and reliability by assigning values that were analyzed using the index of Item-Objective Congruence (IOC) [51]. The lowest IOC value retained for the questionnaire was 1.00, as studies have suggested that items with values ≤ 0.67 should be modified or eliminated based on experts' suggestions [52]. Questionnaire reliability evaluation used 30 student teachers from the authors' local campus. Assessment of the 30 student teachers' pre-survey questionnaires' reliability used Cronbach's alpha (α) for each item [53]. The calculations showed that Cronbach's reliability value α average was 0.94.

Table 1. Likert scale evaluation criteria

Rank	Expected condition/Real condition	Mean Range	Need Level
5	Highest	4.50 – 5.00	the most
4	High	3.50 – 4.49	a lot
3	Moderate	2.50 – 3.49	moderate
2	Low	1.50 – 2.49	little
1	Very Low	1.00 – 1.49	minimal

3.4 CPSS training course development

The CPSS training course using the digital storytelling development process was divided into three components. The training courses consisted of students, which were undertaken in August 2020. These were:

a) Draft the CPSS training program using digital storytelling for the 30 proposed undergraduate Computer Education Program students.
b) The appropriateness and congruency evaluation of the draft training program was checked by a different group of three experts using a training evaluation form. The

form was divided into two parts, with the first part *appropriateness evaluation* using $\bar{x}$ and SD. The results for this process were strong as the $\bar{x}$ = 4.60, SD = 0.53. The second part was the *congruency evaluation* of the program, which had an IOC = 1.00. The calculations showed that Cronbach's reliability value α average was 0.96.

c) The *inter-rater reliability* evaluation method was used to assess the creative problem-solving test by three examiners [53] (Table 2). A commonly accepted value of 75% is used for most disciplines.

Table 2. The CPSS validity check test results

Test	Examiner-1		Examiner-2		Examiner-3		Min	Max	R
	$\bar{x}$	*SD*	$\bar{x}$	*SD*	$\bar{x}$	*SD*			
1st set	6.533	1.106	6.600	1.102	6.667	1.061	0.737	0.927	0.856
2nd set	13.233	1.995	14.367	2.999	13.433	2.223	0.752	0.931	0.865
3rd set	9.733	1.818	9.867	1.815	10.200	2.413	0.747	0.930	0.862
4th set	23.100	2.090	23.967	2.236	23.567	1.695	0.764	0.934	0.871

3.5 CPSS training course student satisfaction survey

The CPSS training course undergraduate student satisfaction survey was constructed in two parts. The first part was concerned with general information about each student, while the second part was the actual survey concerning each student's satisfaction toward the CPSS training course. Responses were ranked using a 5-level Likert scale. Five experts participated in the survey's content validity check in which the I.O.C. was determined to be 1.00, and the reliability was 0.96. Descriptive statistics, including the mean, S.D., frequency, and percentage, were used to analyze the data.

4 Research results

4.1 Teacher survey characteristics

The results from the questionnaire's inquiry into each teacher's characteristics revealed that most of the teachers surveyed were women (75.90%) and under 30 years of age (62.40%). Surprisingly, 92.80% only had an undergraduate degree, while the remaining 7.20% had finished a graduate degree. Finally, 75.60% had one to five years of teaching experience.

4.2 CPSS needs analysis

The CPSS needs analysis was undertaken by analyzing the *actual condition* and *prospective condition* of the 332 teachers serving in the Secondary Educational Service Area 1 (grades 7-12) and schools under the Bangkok Primary Education Service Area Office (Grades 1-6). The $\bar{x}$ and the SD were used for data analysis. Need analysis prioritization was undertaken using $PNI_{Modified}$ (Table 3). $PNI_{Modified}$ is a tool often used as an

assessment tool in Thai studies and is known as the modified priority needs index (PNI-$_{Modified}$) [22], [54]-[56]. Originating from research studies conducted by [57] and [58], the modified version is a more robust version whose standard scores in the assessment of needs find the differential value between the desired outcome (I) and the actual results (D) [57]. The calculation formula used for the study was:

$$PNIModified = (I - D)/ D \quad (1)$$

PNI = priority needs index

I = the $\bar{x}$ for the desired outcome

D = the $\bar{x}$ for the actual results

Moreover, a PNI$_{(modified)}$ analysis was conducted to determine the level or rank of each need according to each teacher's input.

Table 3. The teacher needs analysis results for CPSS teaching development

No.	Item	Real condition			Prospective condition			PNI$_m$
		$\bar{x}$	*S.D.*	*Rating Scales*	$\bar{x}$	*S.D.*	*Rating Scales*	
1.	Originality	3.63	0.03	High	4.32	0.05	High	0.19
2.	Fluency	3.70	0.08	High	4.34	0.07	High	0.18
3.	Flexibility	3.66	0.06	High	4.37	0.02	High	0.19
4.	Elaboration	3.69	0.08	High	4.43	0.06	High	0.20
Average		3.67	0.06	High	4.38	0.06	High	0.19

PNI$_m$ = PNI$_{(modified)}$

Table 3 shows that the results for the *prospective condition* for CPSS development was high ($\bar{x}$ = 4.38, SD = 0.06) and for the *real condition* it was moderate ($\bar{x}$ = 3.67, SD = 0.06). Also, the PNI$_{Modified}$ evaluation for each of the four aspects were slightly different from 0.18 (fluency) to 0.20 (elaboration).

Using these results, the authors commenced the development of a CPSS training course focused on the *elaboration* aspect. Part 2 details the results of this process.

4.3 The CPSS training course development using digital storytelling model

The training course for CPSS reinforcement using digital storytelling consisted of four modules. These included 1) 'Let us get to know your computer,' 2) Computer viruses', 3) 'How to use your computer,' and 4) 'CPSS reinforcement .'The four modules take 30 hours which is best divided into six hours daily over five days.

The training course is a behavior that represents undergraduate students' knowledge and ability, which consists of five steps. These include: 1) problem identification, 2) problem understanding, 3) action preparation, 4) solution identification, and 5) action planning. The training steps were:

Step 1: Students complete a pre-test on CPSS, consisting of four parts. These include *originality, fluency, flexibility*, and *elaboration*.

Step 2: Students get trained according to the teaching plans in each lesson. Research has shown that using a participatory action research (P.A.R.) methodology allows participation from beginning to end [59], [60]. Under P.A.R. frameworks, the authors identified the importance of plan development and its continual improvement (*planning*) and the planning implementation for the teaching environment (*practice*). [61], [62].

Step 3: Students complete worksheets for each module. Then, each student presents answers to the class using a digital storytelling process via Padlet. The class scored their classmates' Padlet presentations to determine the highest CPSS score. In Indonesia, Padlet was an excellent digital tool in adding digital skills to each student's German essay writing exercises [46]. Padlet was also positively responded to by the experimental group from the Indonesian study and this Thai study.

Step 4: Students complete a CPSS post-test.

Step 5: The researchers compared scores from students' tests before and after applying the SPSS training course using digital storytelling (Table 4).

Table 4. Mean score comparison of undergraduate students' CPSS (*n*=30)

Score	*n*	$\bar{x}$	SD	t-value	degrees of freedom	Sig.
Student Pre-test	30	45.87	7.91	50.16	29	0.00**
Student Post-test	30	85.60	16.39			

*Significance level at .01

Table 4 compares the mean $\bar{x}$ scores of the 30 undergraduate students' pre-test and post-test CPSS. In the pre-test, the sample group had a CPSS $\bar{x}$ = 45.87, SD. = 7.91. After the 30-hour CPSS training course using digital storytelling, a significant post-test score increased to a $\bar{x}$ = 85.60, 16.39 SD. The results of the CPSS training course model using digital storytelling are shown in Figure 1.

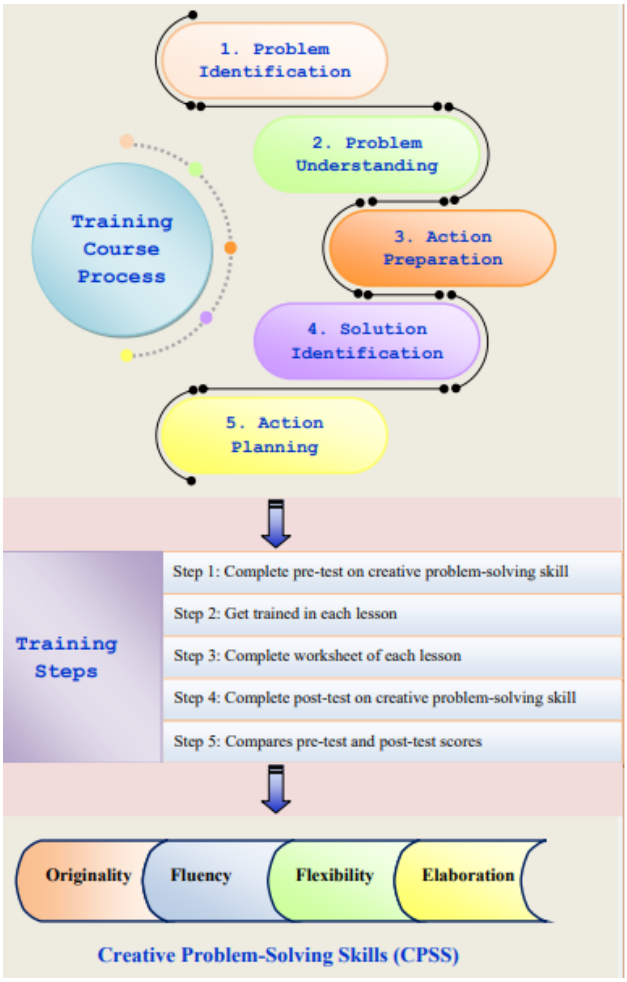

Fig. 1. The CPSS training course using a digital storytelling process model (Source: The authors)

4.4 The CPSS training course development using digital storytelling

The individuals who participated in the experimental CPSS training course were predominantly male (56.70%) and 18-20 years old (Table 5). All students who participated were student-teacher trainees in the Computer Education Program at the Dhonburi Rajabhat University's Faculty of Education.

The analysis of the 30 undergraduate students' satisfaction toward the CPSS training course using the digital storytelling process is shown in Table 6.

Table 5. CPSS training course student sample

Gender	*N*	%
Men	17	56.70
Women	13	43.30
Total	30	100.00

Furthermore, from Table 6's undergraduate experimental group, the authors collected and analyzed their opinions concerning their satisfaction with the CPSS training course using digital storytelling.

Table 6. The CPSS training course undergraduate student satisfaction results

Item	Aspect	$\bar{x}$	S.D.	Rating Scales
Contents		4.59	0.53	Highest
The content has appropriate difficulties.	x1	4.60	0.50	Highest
The content is interesting.	x2	4.57	0.50	Highest
The content is diverse.	x3	4.77	0.43	Highest
The content is related to daily living.	x4	4.43	0.63	High
Learning activities		4.59	0.64	Highest
The learning activities improved my creative problem-solving skill.	x5	4.63	0.49	Highest
The learning activities supported cooperation with classmates and teachers.	x6	4.57	0.63	Highest
The learning activities helped me in doing my research.	x7	4.47	0.82	High
The learning activities helped me search for diverse problem-solving methods.	x8	4.73	0.45	Highest
The learning activities helped me search for new problem-solving methods.	x9	4.57	0.73	Highest
Media and Materials used in the training		4.53	0.62	Highest
The media/materials were engaging.	x10	4.50	0.51	High
The media/materials were easy to understand.	x11	4.43	0.73	High
The media/materials were practical.	x12	4.53	0.73	Highest
The media/materials corresponded with contents and activities	x13	4.67	0.48	Highest
Measurement and Assessment		4.49	0.70	High
I liked helping in assessing my classmates' work.	x14	4.37	0.81	High
I like assessing my work.	x15	4.43	0.73	High
I adapted my assessment results to improve my work.	x16	4.37	0.81	High
The course had diverse measurement and assessment methods.	x17	4.57	0.63	Highest
The measurement and assessment methods corresponded with the CPSS course activities.	x18	4.70	0.47	Highest
Benefits gained from the training		4.62	0.54	Highest
I enjoy doing worksheets.	x19	4.63	0.61	Highest
I like practicing the CPSS exercises.	x20	4.77	0.43	Highest
The course allows me to use my CPSS course knowledge in daily life.	x21	4.53	0.51	Highest
I like encouraging my classmates to solve problems creatively.	x22	4.43	0.63	High
I like helping my classmates know and understand the contents more.	x23	4.73	0.45	Highest
Average		4.57	0.61	Highest

5 Discussion

The study of the needs in CPSS development of undergraduate students shows that the overall *prospective condition* of the development was at a high level ($\bar{x}$=4.38, S.D. = 0.06), which was significantly higher than the *real condition* ($\bar{x}$=3.67, S.D. = 0.06). The findings also revealed that of the four aspects identified for developing undergraduate CPSS, *elaboration* was at the top of the priority of needs ($PNI_{Modified}$ = 0.20, $\bar{x}$=4.43, S.D. = 0.06). This was followed by *flexibility* ($PNI_{Modified}$ = 0.19, $\bar{x}$=4.37, S.D. = 0.02) and *originality* ($PNI_{Modified}$ = 0.19, $\bar{x}$=4.32, S.D. = 0.05). Finally, was *fluency* ($PNI_{Modified}$ = 0.18, $\bar{x}$=4.34, S.D. = 0.07).

Support for elaboration's use in teaching creative thinking comes from a similar study from Indonesia in which elaboration was identified in teaching math [63]. This was also consistent with another study in which creative thinking's indicators were *fluency*, *flexibility*, *originality*, and *elaboration* [64].

Elaboration has been stated as the ability to solve problems by envisioning details overlooked by others. It is the ability to solve a problem with step-by-step and elaborate thinking. It can solve problems with explicit explanations and perfectly complete the main idea. This skill is suitable for undergraduate students of computer programs who need to develop multiple programs and systems. Moreover, elaboration is indispensable as it helps in creating products or processes.

This conforms to Kneller [14], who stated that elaboration is vital in successfully creating new works. Creativity is composed of unique and new things and the consciousness of creative success. However, other elements of CPSS, such as flexibility, originality, and fluency, are also crucial. They must cooperatively support each other to apply them in creative problem-solving. Therefore, with the ultimate focus on elaboration, these four aspects should also be promoted to encourage students to have CPSS [65], [66].

5.1 The CPSS training course development using digital storytelling model

Support for the model's development and usefulness comes from multiple studies. Our model identified five steps in the CPSS training course process. These included *problem identification, problem understanding, action preparation*, *solution identification*, and *action planning*. In another Thai study, the author determined that *problem identification* helped teach student *creativity* for social studies [15]. Other authors have added that an essential goal for the education system in Thailand is developing student and undergraduate problem-solving skills [67].

In Indonesia, knowledge in teaching problem-solving skills was also stated as essential as the success of student lives depends on their ability to solve various life problems [53]. Furthermore, Jonassen [68] has added that problem-solving models can also be effective when using a four-step process. His suggestion includes the *problem's presentation,* the *problem's articulation, alternative solution finding*, and *justification and argumentation.* Therefore, CPSS model goals should entail each stage's ability to teach divergent thinking and convergent thinking [69]. Other researchers have also pointed

out that digital storytelling increases digital literacy and pre-service teacher professional skills [70].

5.2 The online CPSS training course and Padlet

In the CPSS training course design evolution, multiple learning management and collaboration tools were investigated. After comparing multiple applications, a decision was made to use a digital tool from the small, decade-old California firm Padlet. Padlet allowed each of the 30 Computer Education Program undergraduate students to collaborate with their writing exercises, images, and video content through their digital storytelling exercises [46]. Furthermore, other educators have found Padlet to be a helpful information literacy tool as it functions across various devices, does not need the creation of individual accounts, and needs no special technical knowledge [71].

Also importantly, Padlet was a valuable tool for each student's assessment and feedback of their classmate's 'stories .'However, due to the nature of Thai culture, critiquing another or one's work is sensitive, as can be seen from the two lowest scores of the 23 items assessed for the training course student satisfaction (*x14* and *x16*). Therefore, student assessment of any CPSS training course exercises might be a stumbling block in any future training courses.

5.3 CPSS training course pre-test and post-test

The CPSS training course using digital storytelling effectiveness was evaluated using a pre-test and post-test. Results revealed that the students' CPSS after the training course was higher .01 significance level. This shows that the training course was beneficial to the undergraduate students. It embeds undergraduate students with CPSS and thinking skills. This allows undergraduate students to envision multiple solutions to problems they encounter in life.

This study's results conform to another Thai study in which using a training package is highly effective in teaching CPSS [67]. However, CPSS model developers and implementers should pay special attention to the '*problem identification*' stage in their CPSS process, which was determined to have the highest need for development.

It is also vital that students in a CPSS training course are consistent in their attendance from the start to its completion. Instructors also need to ensure that CPSS activities are assigned which arouse each student's curiosity and creativity [72]. However, CPSS is a skill that can be developed with practice and constant training [73] - [78].

5.4 CPSS training course student satisfaction

From Table 5, we can determine that each student's satisfaction with the CPSS training course using digital storytelling was at the highest level ($\bar{x}$=4.57, S.D. = 0.61). Moreover, from the analysis of each of the 23 aspects, it was determined that the training course evaluation students placed the highest importance on the *diversity of the content* (x3) ($\bar{x}$=4.77, S.D. = 0.43) and their *CPSS practice skills* (x20) ($\bar{x}$=4.77, S.D. = 0.43). These aspects were closely followed in importance by *learning activities helping*

attendees to search for diverse problem-solving methods (x8) ($\bar{x}$=4.73, S.D. = 0.45), and *I like helping my classmates know and understand the contents more* (x23) ($\bar{x}$=4.73, S.D. = 0.45). Interestingly, *I liked helping assess my classmates' work* (x14) ($\bar{x}$=4.37, S.D. = 0.81) was at the bottom of the list.

6 Conclusion

This study demonstrated the need to develop the CPSS of undergraduate students. Of the four skills evaluated, the most essential need was *elaboration*. Therefore, university teachers should reinforce student elaboration capabilities by developing and using training projects specifically designed to integrate *elaboration* into their day-to-day subjects.

Also, after experimenting with the training course, it was found that the course was able to develop undergraduate students' creative problem-solving skills at a high level. Therefore, persons concerned can apply this study's research results as the guideline in arranging training courses to improve and equip students with CPSS. The guidelines acquired from the training course can also be adapted in daily life.

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9 Authors

Nipaporn Khamcharoen is a doctoral student in the Computer Education Program in the School of Industrial Education and Technology at the King Mongkut's Institute of Technology Ladkrabang (KMITL) in Bangkok, Thailand. She graduated with a Bachelor of Technology (B. Tech.) degree in Business Information Technology and a Master of Science in Industrial Education (M.S. Ind. Ed.) degree in Computer and Information Technology. She specializes in computer education, computer programming, and computer graphics for education. She can be contacted at 58603020@kmitl.ac.th, https://orcid.org/0000-0002-9049-0888.

Thiyaporn Kantathanawat is an Associate Professor in the School of Industrial Education and Technology at the King Mongkut's Institute of Technology Ladkrabang (KMITL) in Bangkok, Thailand. She graduated with a B.S.W. in Social Work, M.Ed. in Educational Research and Statistics and a Ph.D. in Applied Behavioural Science Research. She specializes in educational research, behavioural Science, educational psychology. She can be contacted at thiyaporn.ka@kmitl.ac.th, https://orcid.org/0000-0002-4436-8806.

Aukkapong Sukkamart is an Associate Professor in the School of Industrial Education and Technology at the King Mongkut's Institute of Technology Ladkrabang (KMITL) in Bangkok, Thailand. He graduated with a Bachelor of Education in Mathematics and a Master of Education Degree in measurement and research education and has a Ph.D. in research and curriculum development. He specializes in education research, curriculum development, and measurement/evaluation education. He can be contacted at aukkapong.su@kmitl.ac.th, https://orcid.org/0000-0002-1234-4033.

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