

A Proposed Framework of Online Collaborative Note-taking Strategy in Self-Regulation Learning to Promote Instructional Design Practice for Pre-Service Teacher

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Abstract

In the 21st century, teachers need to continuously develop their knowledge and skills to work creatively on new ideas. ISTE (2008) standards outlined the teacher's model, which has emphasized on the improving of learning and enriching professional practice by using a variety of digital age media formats. Similarly, The Office of the Basic Education Commission of Thailand (2010) defined teacher qualification competency as both a core competency and a functional competency. A pre-service teacher who is likely to pursue a career in the education system needs to develop these competencies during their period of study. Core competencies such as a working motivation for achievement, self-development, and teamwork are required for a pre-service teacher in a teaching preparation program. As for functional competencies, curriculum and learning management is listed as the most important part of professional development. When the goal of instructional design practice has been set, Self-Regulation Learning is a crucial tool used to control responsibility of one's learning, and consists of self-generated, reflective, and strategic engagement in academic tasks (Zimmerman, 2002). However, from a social-cognitive perspective, the causal factors outlined for motivation include environmental factors. Due to this, self-regulation is a multifaceted process in thought and behavior (Bandura, 1991). During the period that pre-service teachers first experience a real classroom, social support from supervisors in school, university faculty or even their peers can be considered to be environmental structuring in which the learner engages in a common tasks in order to solve problems, complete tasks, or create products. Note-taking is one of the strategies which serves as a cognitive tool and allows individuals to become more critical in the reflective cycle. However, this study proposed a framework for an online collaborative note-taking strategy which creates benefits derived from reflection in both learning contexts and the collaborative learning. The aim of this being to help pre-service teachers adjust their personal standards and reach standardized norms during supervised, field-based teaching experiences. The collaborative engagement process was designed to have three phases: forethought, performance control, and self-reflection. All of these are used to promote self-regulated learning when pursuing a classroom management based goal in the instructional design practice. The first phase is comprised of the analysis of practical problems by researchers and practitioners (Christensen & West, 2018).

1. Introduction

Pre-service teachers begin the process of developing instructional design in schools while engaging in practice for later professional experiences. The practices require a self-regulated process to perform successfully, from planning the instructional learning design, to controlling their performance in learning design and teaching, to becoming a reflective teacher in order to improve the effectiveness of their teaching. The process of coordinating work from supervisors in schools, university faculties and among their peers all provides feedback and supports collaborative work. Therefore, the development of a self-regulatory process in instructional design practice is extremely important. Consequently, it is stated individual motivation may arise from environmental factors for regulated, pre-service teachers working and learning within this context. This is especially so when they are working collaboratively in learning design and development, and corresponds with the theory of social cognitive learning, Bembenuity (2011).

One problem that can be observed is that pre-service teachers' professional experience gained from working in real-life environments often lacks effective self-regulation in learning design and development. Because they are teaching for the first time in a real-life setting, pre-service teachers must deal with various scenarios, arising both from the pressure of the institution and the school. Although adaptation in every area is important when becoming a professional teacher, instructional design remains an important issue to consider in the early stages of teaching. In some cases, students may focus on other aspects of adaptation and forget that they need to develop the effectiveness of their teaching. As Sever (2016) stated, instruction refers to the starting, leading, easing and implementing of learning and effective classroom management. In this research, we defined self-regulation as the process of designing classroom management through three important steps, namely: the

forethought, performance, and reflection phases (Zimmerman, Bonner, & Kovach, 2009). This was completed using collaborative notetaking to increase the efficiency of effective instruction.

2. Research Design

Design-based research is a systematic approach used to plan and implement innovations by working collaboratively with practitioners over three phases, including: analysis and exploration, design and construction, evaluation and reflection (Huang, Spector, & Yang, 2019). This paper presents the first phase of the study “analysis and exploration”, as well as “the early step of design and construction”. In addition, design thinking was introduced in conjunction with the utilization of knowledge and practice to find viable solutions and meet needs, primarily using a technology-driven approach (Koh, Chai, Wong, & Hong, 2015b). We applied the design thinking approach to be able to bring valuable insights into the practice of design-based research. As a result, design thinking will play a multidisciplinary, collaborative role to produce innovative products, systems, and services (Christensen & West, 2018; Koh, Chai, Wong, & Hong, 2015a; Skogstad & Leifer, 2011). The elements and outcomes of this early stage of research are shown below in table 1.

Table 1. The elements and outcomes from the early stages of design-based research adapted from (Huang et al., 2019)

Design-based research phases	Design Thinking stages	Elements	Outcomes
Phase 1: Analysis and exploration	Empathize	Learn from an audience via a semi-structured interview	User needs and understanding of problems
	Define	State the problem and role of objectives	Statement of problems
Early steps of Phase 2: Design and construction	Ideate	Review of literature Draft principal to guide the design of blueprint	Learning design blueprint
	Prototype	Propose framework	Prototype

Throughout the empathize stage, we collected qualitative data using a semi-structured interview with two pre-service teachers and one supervisor in a school setting. This was done to identify real, problematic conditions, the result is summarized in the following table.

Table 2 Qualitative data from the empathize stage

	1 st Pre-service teacher from Advanced English major.	2 nd Pre-service teacher from Computer and special education major.	English Teacher (Context of supervisor in school setting).
Task Analysis	Consider the issue of classroom management, therefore determine learning environments that are appropriate for the content and time.	Looking for what kind of learning environments occur in the classroom and then think of the issues that are appropriate for that context.	No fixed criteria set for students and do not force them. Let students analyze content and organize time-management by themselves.
Planning	Using one style of classroom management for the whole semester. However, it has been found that the planning was not as good as it should be.	Start with the students' and the school's needs.	Have students make a draft of classroom management including both the learning environments and classroom rules.
Pattern of Working	No fixed format but must submit a plan to the	If it is found that learning activities don't	Have students propose the classroom

	teacher a week before presenting it to the mentor. It took 2-3 hours to develop a classroom management plan and they are completed at one time.	work, then cancel the old ones and start to revise. One plan can be completed within 3-4 hours.	management plan, but without changing their line of thought. Just suggest situations which can occur when using this activity.
Pattern of Notetaking	Note-taking for ideas by writing important topics in order so as not to forget about them, sometimes putting the bullet and content on the presentation slide.	Note in diary or note on the phone as bullets and checklists of media items to prevent forgetting. Sometimes interesting content will be recorded as hyperlinks.	Encounter Face-to-Face comments because when sending via mail or sharing a folder, teacher doesn't have enough time to check, teacher prefer to sit and watch and fix.
Help-Seeking	Start thinking mostly on their own at first, sometimes asking friends if the activity is possible or not. Most of them consulted friends who went to the same school in an informal environment, like while they were having lunch.	Rarely ask for help from others. Like to work individually at first and then ask friends for input. Seeking help from friends when meeting face-to-face, for example, at seminars.	Providing help only when students face real problems but will not block their creativity when developing ideas or organizing activities.
Help-Seeking Channel	Verbally discuss with friends on the Line application. Send an email to their supervisor, if the professor has time, they will join the student to aid in solving their problems.	Like a face-to-face style. Like to do it themselves at first, then asking friends who teach at the same level for comment sharing.	-
Working Process	When they do not have experience in a certain area, they tend to ask for opinions from people who know how the subject will be taught. In reality, the supervisor has high workload, meaning that they are not always able to help.	Hand in classroom management plans via email, if there is time, the teacher will make an appointment to discuss it with the student or if they don't have time, send comments via email.	For the first comments that are provided, it takes 3-4 rounds of returning feedback. After students have a greater understanding, then frequency will be decreased.
Pressure	Serious mentors sometimes do not give positive feedback, even if it should be. Giving negative comments can cause work pressure.	Pressure occurs with high self-expectations and not understanding the content that needs to be taught.	-
Self-Control	Supervisors have high expectations to do well. They must also think of students who have	Reinforce and reward, this could be done by buying things for oneself.	-

	expectations of pre-teachers.	Forcing oneself to finish tasks.	
Learning Motivation	Looking at the benefits students receive is important.	Watch programs that inspire and teacher with whom you have a good relationship to find a solution to the problem.	-
Time-Management	Have a time limit with the scope of work being made clear, then choose to manage time by oneself.	Not doing as well as one should, due to not working gradually. Non-completed work will become a burden in the future.	-
Strategic Planning	Prefer the style of sitting and talking the most.	Work what is preferred personally at first, then gradually complete other tasks. If it is an important job, do it alone to concentrate and relieve the pressure from people around.	Provide feedback before and after the lesson. However, not recommended by the teacher as it will block creativity.
Self-Reflection	Reflect upon comments from a mentor often to improve and implement changes. Not often talking to others after teaching because the focus is on making new learning management plans.	Write it as a short note on a Post-It and then write it again later, in a post-teaching record document. Do not use the notes after teaching for discussion but keep records for discussion with supervisors.	-
Platforms	Use email because the file doesn't disappear.	Have conversations and talk face to face due to fear of misinterpretation.	The teacher has a lot of work and is not always able to use email. Therefore, choose to use an offline channel or allow the students to take the computer with them to edit on the computer immediately.
Collaborative Notetaking	Useful but may not always have to be done because it will increase workloads.	The concept of watching together because it help other to understand as well.	Able to work together, both when typing and writing.

Defining change of problems and assumptions

From the semi-structured interview used during the empathize stage, the true root of the problem was found. During the forethought period, most pre-service teachers had the same method of job analysis. When planning, long term thinking was usually focused upon for classroom management. As for the work style, it was found that there was no exact pattern. Most of them tended to design classroom management to be based around the whole semester, which takes an average of 2-4 hours. While supervisors prefer to see intensive work during the first period of a teacher's professional experience, pre-service teachers usually relax in terms of strictness after they have developed a good grasp of the guidelines. However, this must not prevent the creativity.

Regarding strategy, it has been found that students prefer to sit and talk most, and they will also do work that they want to do first, then gradually move onto other pieces of work. As important work requires a lot of concentration, it usually is usually done alone, relieving pressure placed on the worker by people around them. Students often want to be alone when spending time designing learning environments. Therefore, they would like to be provided with comments before the design process, and then to receive feedback after the teaching is finished.

During the design process, students often record ideas in a small notebook or on mobile devices, and document only the important topics. In the note-taking process, they select links that they see necessary to put in a personal note. Students often draft content into a presentation slide, then adding said content to the learning management plan later. Despite this, it is preferred by the supervisor of the educational institution to engage in face-to-face feedback, for the reason that they do not have enough time reply to emails. In addition, help-seeking personalities mostly tend to plan alone. If unable to complete tasks, they will ask for the opinions of friends, for example, whether it is possible to complete the activity or not. Most of them would consult friends who went for teacher training at the same school in informal environments, such as while eating lunch. The main method of asking for help consists of verbally communicating with friends, using the LINE application and email as communication tools. However, in a real-life situation, it was found that most students still had to print out the learning management plan, and then send it as a document to the teacher. The plan was then used by supervisors to sit down with the student and engage in further discussion.

It was found that most pre-service teachers did not like it when the teacher gave direct instructions on what to do. They tended to complete tasks firstly by themselves, then taking on comments later. While thinking about design, classroom management plans are often shared with peers who are studying on the same level as themselves. They tend to ask for opinions only from those who are not familiar with the scenario at hand. Due to the supervisor having a high workload, they were often unable to help at all the time. In terms of work pressure, pre-service teachers like to receive positive feedback to increase positive motivation. In addition, rewarding oneself is another method that can be used to motivate. Sometimes, they choose to use media such as inspiring videos that speak about topics which motivate them in order to design an effective classroom management plan. As for time management, pre-service teachers like the time and the scope of work to be set out clearly, so that they can manage their time by themselves. However, it was found that most students do not manage time well.

During the stage of reflection, it was found that students lean towards writing their own short notes on post-it notes. Supervisors would provide a lot of comments to be used for improvement and then write summaries after teaching in their own format. However, most did not talk to others after teaching because they were inclined to focus on making new learning management plans. Lastly, when it comes to the platform that is used, there are students who use email because the file can be kept as evidence and does not end up being lost. Though, they also like face-to-face conversation, because they fear misinterpretation and they can ask about items that they do not understand clearly. Conversely, the supervisors have a very high workload and are not always able to use email. Therefore, they choose to use communication methods such as the LINE application, or turning on the computer and sending feedback immediately. Lastly, if there were a platform that allows them the opportunity to take notes together, it would be useful, but they may not have time to use it after each session because of their heavy workloads.

Additional findings

The assumptions that were made are both consistent and inconsistent with the qualitative data. In addition, it was found that if the framework was developed to facilitate the self-regulation of learning in the design of classroom management, it should have the following important characteristics;

- Set a clear work goal.
- Specify the duration and scope of work.
- Customize notification styles, manually configuring notifications.
- Chat both synchronously and asynchronously.
- Formulate one's own work strategy.
- Save ideas in personal notes in an unofficial format.
- Supporting and seek help when needed.
- Create a submission area and keep notebooks together.
- Reward and send the positive feedback in various forms.
- Allow the media to create motivation.
- Build a collection of evidence and trace work.
- Self-control tools.
- Self-reflection tools.
- Self-assessment both in the form of checklists and ratings.

Ideate Stage

The creation of solutions to problems must use previous theory, as well as research and practice which consist of the synthesis of theories related to instructional design in this research context. Self-regulated learning, collaborative note-taking and communication platforms are also important in this process. This allows us to develop the features necessary to create the prototype as follows;

Pre-Service Teacher Instructional Design Practice

The demand to help students develop 21st century competencies is increasing, so we need to reevaluate prospective teachers who are developing their potential to work creatively with ideas for sustained teaching improvement (Koh et al., 2015b). As stated in the ISTE Standards (ISTE, 2008), the effective teacher model is a teacher who inspires student learning and creativity using their knowledge of subject matter, teaching and learning, and technology. These teachers will also be able to communicate relevant information and ideas effectively to students, parents, and peers using a variety of digital age media and formats. Consistent to UNESCO (2008), and according to the ICT teacher Competency Standards, the professional development of teachers is a key part of becoming master learners and knowledge producers themselves when in teaching practice. Effective teaching and learning cannot take place without applying classroom management sufficiently. Therefore, a teacher will take the role of classroom manager, setting the classroom rules and creating an effective learning environment (Sever, 2016). Davis (2018) proposed a solution of bringing in stakeholders including university faculties, supervisors, cooperating teachers, and pre-service teachers, and having them work together to incorporate and agree upon a positive learning environment to be used in the classroom. Lawrence-Wilkes and Ashmore (2014) stated the role of reflection in learning and development, as embedded in professional education for educational practitioners. This allows for continued professional development, work-based learning and lifelong learning. Teachers might reflect on the contextualization of multiple factors in order to create both a layout and the students' preferred learning environment (Hamilton, 2019).

Self-Regulated Learning

When a goal of instructional design practice has been set, self-regulated learning becomes a crucial process used to control responsibility. Self-regulated learning consists of three keywords: Learning, which means activities in the pursuit of knowledge and development of governance skills. Regulation, which is the examination of work in its current state compared to the goals that have been set, such as learning goals. Self, which means the context of achieving one's personal goals. Therefore, self-regulated learning means the acquisition of knowledge and skills done in a self-navigated manner, and using one's own motivations. Students can set their own goals and learning strategies in order to achieve main goals by relying on periodic self-assessment, comparing current work and strategies to goals set, and then adjusting strategies as needed (Hall & Goetz, 2013). Whereas Zimmerman (1989) proposed the cycle of regulation including person, behavior, and environment which all affect each other, and later on, Zimmerman (2002) specified the model of self-regulated learning consisting of 3 important phases, which are the Forethought Phase, Performance Phase, and Self-Reflection Phase.

Collaborative Note-taking strategy

Previous research has shown different methods of notetaking. E.g. The Learning Strategies Center (2001) Cornell University has outlined a process of taking notes, including recording lectures and using note columns. Other methods include the use of questions to reflect on the content by asking oneself questions. An example of this would be, what is the importance of facts? What are the principles? The final method is a review that takes at least ten minutes every week to check what has been recorded. This process can be applied to the design of teaching and learning conducted by students in the teaching profession. However, from a social perspective, Seel, Lehmann, Blumschein, and Podolskiy (2017) have revealed the three presences (Social, Cognitive, Teaching) and their relation to instructional activities. This concept is in line with the social cognitive theory that was originally developed by Bandura (1976), who described social learning theory as a learning process that can occur from other people. This happens through the observation or modeling of the experiences of others, without the need to experience trial and error by oneself. The learning process occurs during interaction with an environment and taking part in an observing or imitating process.

We brought both concepts together and integrated them with emerging technology which has resulted in more notes being made online. Yang and Lin (2015) proposed online collaborative notetaking strategies that allow other people to use online memo boards, which can be combined on the same sheet for the same period. Reflection was defined by Glasswell and Ryan (2017) as a collaborative process which engages others to enable them to think differently. This process can be applied to teaching design in both learning planning and controlling of efficiency in learning design. Pre-service teachers might reflect in order to improve efficiency,

encourage stakeholders to participate, expand ideas, and provide necessary support and feedback. In this study we synthesized the tools and platforms that can be used by pre-service teachers for collaborative notetaking.

Table 2. Synthesis of the right tools for collaborative notetaking

Tools	Goodnote	Noteability	Evernote	Word Document Onedrive	Oonenote	Google Sheet	Sketchboard	Microsoft Whiteboard
Web Application	✗	✗	✗	✓	✓	✓	✓	✓
Mobile Application	✓	✓	✓	✓	✓	✓	✗	✓
Import files	✓	✓	✓	✓	✓	✓	✗	✗
Typing	✓	✓	✓	✓	✓	✓	✗	✗
Collaborative-typing	✗	✗	✓	✗	✓	✓	✗	✗
Free Handwritten	✓	✓	✓	✓	✗	✗	✓	✓
Drawing Pen	✗	✗	✓	✗	✗	✗	✓	✓
Sharing to others	✓	✓	✓	✓	✓	✓	✓	✓
Free	✗	✗	✓	✓	✓	✓	✓	✓
In App-purchases	✓	✓	✓	✓	✗	✗	✓	✓

A Proposed Framework

The design of the online collaborative note-taking strategy used in Self-Regulated learning for pre-Service teachers is still in its first stage. Zimmerman's (2002) Self-Regulation model was adopted by the researchers, consisting of three main steps, namely the Forethought Phase, Performance Phase and Self-Reflection phase. This was done by identifying the sub-steps of issuing self-regulated learning at each stage that is necessary and then dividing into the categories of teaching and learning under the roles of the learner and instructor. We have drafted the concept of collaborative notetaking to be used as a working tool. Then, the study of related concepts and theories allowed us to develop the prototype on an online learning design platform together with the instructional design process.

Table 3. A proposed of learning design blueprint

Steps	Activity	Instructional media/ Technology	Roles of Learner	Roles of Instructor
Forethought Phase	Set clear goals from designing a long lesson plan	Collaborative Sheet Task lists	Set the terminal goal	-
	Determine the duration and scope of work	Online Calendar	Create a working timeline Share the timeline with instructors	Share a working timeline with instructors
	Customize the notification form manually	Reminder Notification	Set notifications	-
	Meet for a chat both synchronously and asynchronously	Chat Link to Social Media Platform	Communicate with others as necessary	Provide feedback as necessary Send a reinforcement message
	Define their own work strategies	Task lists	Set working strategy and tasks	-
Performance Phase	Create a work delivery area and Create Online Collaborative Notetaking tools	Online Notetaking	Create Online Collaborative Notetaking tools	-
	Collect ideas in an informal format via personal notes	Online Notetaking	Taking note online (Free style format)	-
	Support and seek help when needed	Collaborative Notetaking (sharing setting) Chat	Seeking help or Giving help	Providing support as requested

		Link to Social Media Platform		
	Provide rewards and positive feedback in different ways	Digital Badges Hyperlink	-	-
	Provide various types media to create motivation	Video, Hyperlink	-	Post links or videos
	Collect learning evidence	Personal Drive Submit Task button	Collecting work	-
Self-Reflection Phase	Self-control and self-reflection	Progress bar Checklist	Reflect	-
	Reflect yourself with use of checklists and ratings	Forms Portfolio	Self-Evaluation	Student's Evaluation

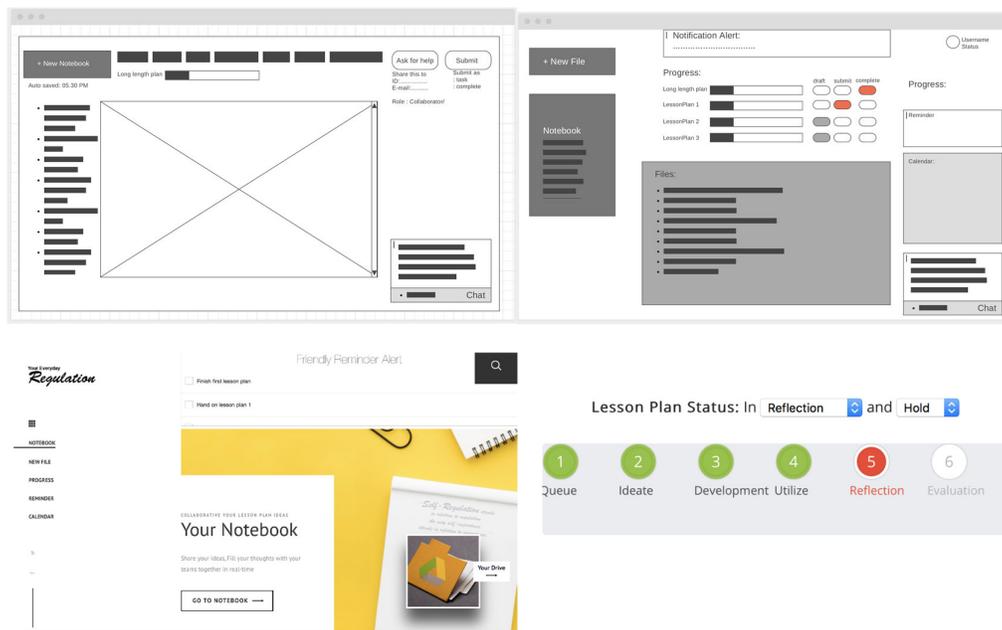


Fig 1. The wireframe and prototype developed for collaborative notetaking

Future Design direction

With the use of the first prototype, we have found weaknesses in the prototype which are;

- The researcher was unable to develop collaborative notetaking at this time. Therefore, links from free to use, external readily-made resources are required.
- From the study, it was discovered that there is no application that has the ability to record both typed and free hand notes together, including the ability share and giving further opportunities to collaborate.

Further Research Work

This paper has thrown up the ideas of a conceptual framework of online collaborative note-taking strategy in self-regulation learning for pre-service teacher, therefore, this is a guideline for furthering and creating a learning community and promote productivity to improve classroom management and can be applied in the professional development process to achieve the competencies necessary for future professional practice. However, this is in the early stage of research, further work needs to be done to establish the fully develop web application and whether to investigate the ease of use and the effects of using the tools on level of self-regulation.

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