Abstract—Conference or journal publishing paper is particular of condition for graduate student. The goals of research and development are provide to Graduate students for critical thinking skill and Publishing quality research paper in time. Learning Activity Management System (LAMS) is tool for managing learning activities be used with critical thinking technique for research writing to develop virtual environment system based on critical thinking to support journal writing process for graduate student. The system was designed with integration between research writing methodology and two-way communication Technology among peer’s group and professional via LAMS. The set of activities in LAMS develop from some path of six thinking hats theory for reflecting and discussing with difference perspective. The results indicate with Cornell critical thinking test level z for better results and good research paper.

Index Terms—Learning Activities Management System (LAMS), Critical Thinking, Journal Writing Process, Virtual Environment.

I. INTRODUCTION

Writing is skill that can approve with reading and practicing but writing research papers have to use thinking and choosing the compatible information for using. Internet and Information Technology help researcher develop research working and practice thinking to be critical thinking [1], [2]. The Objectives of this paper are development research paper writing support system. The system is included with Critical Thinking Model (6 hat thinking), LAMS (Learning Activity Management System), Research Writing Model and OJS (Open Journal System) as show in Fig.1.

The System divided into 2 paths on LAMS and OJS. LAMS use for practicing and learning to critical thinking for research writing [3]. Learning via LAMS for researcher to know about develops critical thinking steps. The system for publish testing on OJS that make online draft publishing from group of peer and group of expert [4], [5].

Researchers have to register to the system with basic information about field of research topic for example title, variable, keyword and describe about own research.

A. Problem Statement

One of the conditions for graduating of Ph.D. student is every Ph.D. candidate have to publish their research paper to international journal. International journals have long period for considering and adjusting for accept to publish each research paper. Each year many Ph.D. candidates had been retired because cannot publish in time. Submitting good research paper will help reviewer to consider research paper and need short period for considering and adjusting for accept to publish.

B. Research Objective and Questions

The main objective of this study is to examine the impact of the system to towards Ph.D. student’s critical thinking and writing performance in research paper writing. This study is designed to answer the following research question: What are the differences in critical thinking and research writing before and after passed the system?

II. THEORETICAL BACKGROUND

A. Critical Thinking Model

Critical thinking means to describe it as reasonable, reflective, responsible and skillful thinking these are focused on deciding what to believe or do [6], [7]. Person who thinks critically can gather relevant information, ask appropriate questions, efficiently and creatively sort through this information, reason logically from this information, and come to reliable and trustworthy conclusions [8], [9].

The critical thinking model that well known is six thinking hats model by Professor Dr. Edward de Bono [10], [11]. It is a simple and effective system for developing critical thinking [12]. Thinking is divided into six categories for identify each perspective of thinking. Six Thinking Hats is parallel thinking for focused on and thinking about the same subject at the same time [13], [14].

B. Research Paper Writing Model

Writing high-quality papers suitable for publication within international journals is an essential skill for researcher that is
skill of critical thinking [15]. The important things that research paper reader are expecting a standard form, language, style. Research papers generally follow a conventional format that includes with a title, an abstract, a reference section and the components of the IMRAD structure (Introduction, Methods, Results and Discussion).

III. RESEARCH METHODOLOGY

This paper purpose a system that use Critical thinking solution via LAMS to support Research Paper Writing. The solution integrated research writing Model, LAMS, Critical thinking and OJS together [16]. Good research paper not only from good research skill but also from good research writing with reader friendly language. Almost Good research writing has come from writing with critical thinking in research and writing process [17], [18]. Figure 1 show area with good research paper from intersection of 3 set research writing model, learning activity management system and critical thinking development model [19], [20].

A. Participants

The participants are 12 Ph.D. students in Department of Education Technology, Education Faculty, Chulalongkorn University and 5 research experts from 5 universities (Chulalongkorn University, King Mongkut’s University of Technology North Bangkok, Prince of Songkla University, Burapha University, and Mahasarakham University). The Ph.D. students are peers and writers. Research experts are expert reviewer for this experiment. The writer participant random from the group of Ph.D. Student have these Qualifications (Passed Qualify exam, need to develop own Research paper, and Passed CU-TEP (Chulalongkorn University Test of English Proficiency) or TOEFL score more than 500) [21], [22].

B. Measurement Scales

The system has a pretest and a posttest with Cornell critical thinking test level-z as show in Fig. 2.

The Cornell critical thinking test is a famous test set for measuring level of critical thinking in person, level-z test was designed for adult person in college or university [23].

The pretest and posttest will test with full 7 parts 52units in 50minutes but we will focus only some units that have relative with research writing [24]. The relation about critical thinking and research writing are choosing data, interpretation, evaluation argument, and inference. Between a pretest and a post test this system will keep all information in communication between group of peer and group of expert.

C. Research Design

The system was integrated with 26 units of activities. Each unit has difference objective, but all objective for develop critical thinking. The unit of activities make from critical thinking development solution of six thinking hats (thinking model by Edward de Bono) [25] as show in Fig. 3.

![Fig. 3. Sequence of activities to critical thinking for research writing](image)

**Fig. 3. Sequence of activities to critical thinking for research writing**

<table>
<thead>
<tr>
<th>TABLE I: THE LIST OF ACTIVITIES UNITS</th>
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The lessons for researcher were designed with things to knowledge about critical thinking and development. Unit of
activities can divide for 4 categories as show in TABLE I. For each activity unit have objective for develop skill of critical thinking to support research writing. Each critical thinking skill was developed and practiced many times.

K= Knowledge (How to write with critical thinking.)
T= Testing (Pretest - Exercise - Posttest)
S= Sharing (Sharing with difference experience)
X= Exchange (Exchange with difference perspective)

1) Critical Thinking Support Sequence
   Critical Thinking Support sequences are icons inside LAMS for each function. :
   • CT Survey:
     Researchers have to finish the critical thinking test (pretest and posttest).
   • CT Learning:
     Researchers have to learn about critical thinking steps.
   • Thinking Exchange:
     Researcher peer group and expert group will offer suggestion or perspective about researcher’s paper.
   • CT Practice:
     Researchers have to practice to critical thinking with reading research paper.

2) Research Writing Support
   Research Writing Support units have both in LAMS for adjusting technique or variable or perspective and OJS for adjusting language (Grammar and words) as show in Fig.4.
   • LAMS:
     LAMS is a revolutionary new tool for designing, managing and delivering online collaborative learning activities. Online learning and practicing for Critical thinking.
     Each researcher has to login to the system to be peer each other [26].
   • OJS:
     Open Journal Systems (OJS) is a journal management and publishing system that has been developed by the Public Knowledge Project through its federally funded efforts to expand and improve access to research. Researcher send own draft of research paper in process of OJS for checking Grammar and wording only from expert [27].

After each researcher passed all activity sequences in LAMS, then the system will bring to OJS for adjusting grammar and word.

Open Journal Systems (OJS) is a journal management and publishing system that has been developed by the Public Knowledge Project. OJS assists with every stage of the refereed publishing process, from submissions through to online publication and indexing. The system grained indexing of research, and the context it provides for research to improve both the scholarly and public quality research [30] as show in Fig. 7.

This Research uses the standard publishing sequence of OJS. Every peer has to try publish own draft paper to OJS for exchange knowledge and found weak point in the paper (research method and grammar writing).
IV. DATA COLLECTION AND ANALYSIS

After all researchers pass all of sequences in LAMS, the system can keep information for each researcher for compare progressive and critical thinking level. Open Journal System (OJS) can help adjusting research method, adjusting grammar and wording from expert. The system can get information, comment, and difference perspective from peer. Each researcher will get a good research paper for send to any international journal publisher.

V. CONCLUSION

This system is working with test set of researcher. The test set is set of 10 Ph.D. candidate students. All of researcher was developing research paper in education technology area; expert group is education technology expert also. All of sequence had finished about 4 weeks (from the first activity to the last activity). Critical Thinking post-test score higher than pretest score all of critical thinking skill for research writing.

REFERENCES


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