Critical Thinking Solution via LAMS for Virtual Environment to Support Research Paper Writing

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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.
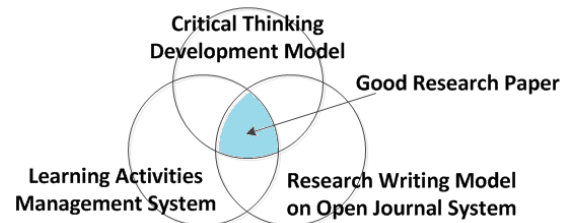
Fig. 1. Concept for good research paper.

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].
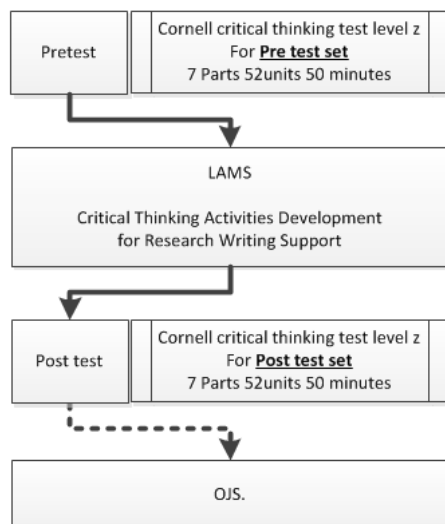
Fig. 2. Position of pre and post testing Set

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

TABLE I: THE LIST OF ACTIVITIES UNITS

Unit / Categories	K	T	S	X
Activity Unit1	set	-	-	-
Activity Unit 2	-	set	-	-
Activity Unit 3	set	-	-	-
Activity Unit 4	-	-	set	-
Activity Unit 5	-	-	-	set
Activity Unit 6	-	-	set	-
Activity Unit 7	set	-	-	-
Activity Unit 8	-	-	set	-
Activity Unit 9	-	-	-	set
Activity Unit 10	-	-	set	-
Activity Unit 11	-	-	-	set
Activity Unit 12	set	-	-	-
Activity Unit 13	-	set	-	-
Activity Unit 14	-	-	set	-
Activity Unit 15	-	-	set	-
Activity Unit 16	-	-	-	set
Activity Unit 17	-	-	-	set
Activity Unit 18	set	-	-	-
Activity Unit 19	-	-	set	-
Activity Unit 20	-	-	set	-
Activity Unit 21	-	-	-	set
Activity Unit 22	-	set	-	-
Activity Unit 23	-	-	set	-
Activity Unit 24	-	-	set	-
Activity Unit 25	-	-	-	set
Activity Unit 26	-	set	-	-
	5times	4times	10times	7times

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].
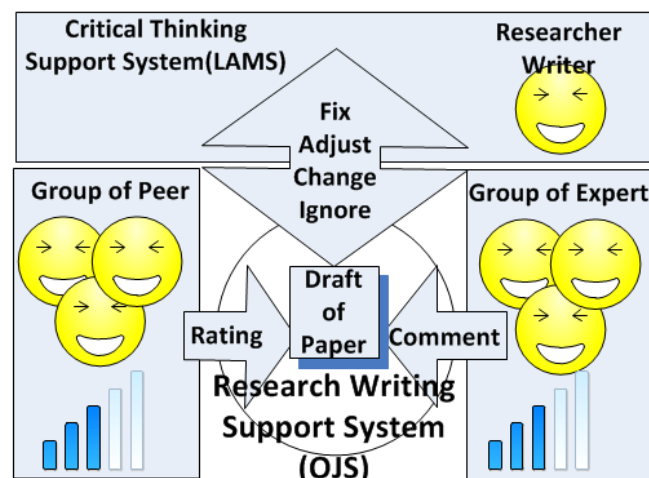

Fig. 4. Group of peer and expert to rate/comment on OJS

Each peer and expert can read the draft of research paper in the system and can rate score and comment to each paper [28], [29]. The researcher or writer can get the score and read all of comments from peer and expert.

Every researcher or writer can choose to fix all, fix some or ignore all from peer's comment but has to adjust in every comment from expert. The system has log files for record everything that all peer and expert comment to each paper.
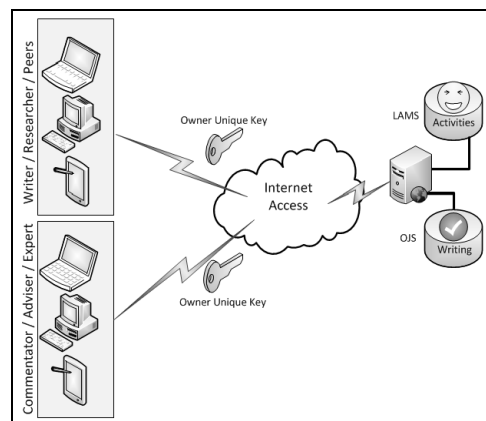

Fig. 5. Network diagram to access the system

Everyone in the group of peer and expert had unique key to access in the system with internet to server that divide to LAMS for Critical Thinking support and OJS for writing support. The good idea for using system pass internet as show in Fig. 5.

D. Tools Development

Learning Activity Management System (LAMS.) is open source software developed at Macquarie University in Australia. The system is an environment for support distributing and creating of collaborative sequences learning as show in Fig. 6. The activity sequence in LAMS can design and adept for each difference environment and situation.

Fig. 6. LAMS for critical thinking online

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).

Fig. 7. OJS for publish testing solution

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.

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