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Enhancing Metacognition Skills by Using Reflective E-portfolio

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Abstract

This study aims to Investigate the relationship between Reflective E-portfolio and Metacognition skills from where it is possible to contribute to the exercise levels of reflective thinking through the E-portfolio ultimately leads to the development of Metacognition skills, the study was applied on 29 Instructional Technology students at Tanta University ، they create Reflective E-portfolio in terms of integration between the stages of the design and production of E-portfolio and the levels of reflective thinking (Description - feeling - Evaluation - Analysis - Conclusion - action plan) simultaneously so that each step of Steps to build E-portfolio be synchronized with each level of the previous levels, and after the completion of the work of open discussion sessions sequential students discussed in which the students accomplished Reflective E-portfolio design and levels of thinking file through the main axes of Metacognition skills such as knowledge about knowledge and evaluation of the documented levels of Reflective E-portfolio as well as knowledge management skills, good planning skills of thinking, was then applied Metacognition skills scale (Pre – post) of the discussions, came the result that there are clear differences in the students' grades for the benefit of the Post- applied .

Keywords: Metacognition ; Metacognitive ; Reflective ; Reflection, E-portfolio.

1.1. Introduction

E-portfolio is one of the important tools necessary in many education systems in developed countries in terms of it importance for both the student and the teacher and the educational institution because of its multi - faceted uses such as assessment, learning and professional personal file. And highlights the importance of E-portfolio in the different types of thinking of the individual, especially reflective thinking.

The Reflective E - E-portfolio the most important tools that were being used to train the student on how to document what he thinks during a certain period of time, it is a tool to reflect pedagogical skills, the real teacher and student, so it must contain the extent of the amount of meditation have either high or low - related content which was compiled either by himself or with his peers (Barrett, 2007).

1.2 Reflection and E-portfolio:

The growth of the reflective thinking of the individual comes through the organization of his experiences and hopes that he can draw his perspective in education again. The importance of this subject lies in the existence of a common relationship between the reflective education and the professional development of the teacher. This was confirmed by Farrell, where she found a relationship between Reflective and Development and that Reflective leads to rapid development. She emphasized that the resulting evolution of reflective leads to better processes within the classroom and educational outcomes (Dewey, 1933), In order to become a practitioner of reflective you must theoretically be based on the way you teach and learn through it, documenting all your reflective practices for all the content you have gathered (Biggs, 2003). Reflection thinking on learning aims and methods which may to extend into new areas, given the novelty of the technologies under investigation. In summary, strengthening the reflective thinking skills into learning and teaching with Web 2.0 offers the potential to ,making student learning and students' skills throughout the investigation process Provide a framework to guide teacher conduct and to also provide them thinking (Turkey, 2015).Provide a professionally reputable and methodologically rigorous evidence base for learning and teaching innovation and improvement across the sector Indeed.

E-portfolio's an important tool for documenting the skills of job performance, helping in the development of self-development plans, as well as in the development of reflective thinking skills in the process of learning (Fitzpatrick,Spiller, 2010), The E-portfolio is one of the tools used by researchers to enhance the process of reflective. There are researches that focused on the participation of learners to their work through E-portfolio and measurement of the process of reflective through it (Stone, 1998), Any system of E-portfolio must contain three main axes (collect - reflective – publishing) (Chmielewski, 2006), There is a need to conduct further research on the importance of E-portfolio as a tool for practicing reflective and self-development (McNeil , Brown , Shaw, 2010), The

process of designing and producing an E-portfolio helps students develop their technological skills and acquire critical thinking skills and problem solving skills (Wang, 2004) , The E-portfolio provides an opportunity for the student to collect, organize and interpret the results of his learning, and increase the skill of reflective thinking in the results of learning through the exercise of activities within E-portfolio(Barhom, 2009).

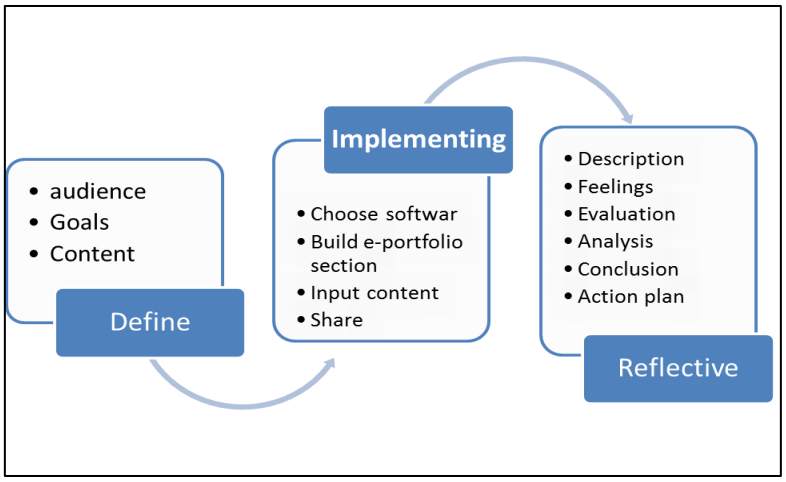

Fig (1) Model of using web portfolio to promote Reflective Thinking Skills
(Mohamed Turkey, 2014)

1.3 Metacognition and reflection

The term metacognition first appeared around 1975 in the work of developmental psychologist John Flavell from Stanford University. He used the term to denote:

> *"One's knowledge concerning one's own cognitive processes and products or anything Related to them [and] refers, among other things, to the active monitoring and consequent regulation and orchestration of these processes, usually in the Service of some concrete goal or objective"*
>
> (Flavell, 1976)

This definition emphasizes the executive role of metacognition in the overseeing and regulation of cognitive processes, and Flavell provides some useful examples of metacognition:

> *"I am engaging in metacognition if I notice that I am having more trouble learning A Than B; if it strikes me that I should double-check C before accepting it as a fact; if I become aware that I am not sure what the experimenter really wants me to do; if I Sense I had better make a note of D because I may forget I; if I think to ask someone about E to see if I have it right" (Flavell, 1976)*

According to (Branford, Brown, 2000) metacognition and self-modify are important elements for developing effective learning and training. As Flavell (1976) pointed out metacognitive skills can be developed through instruction and learning. Among these researchers

Research Methodology and Procedures, indicated that the reason why students fail to become active and independent students is sometimes they lack metacognitive awareness

and strategies (Turner, 1989), argued that students' metacognitive skills can be nurtured through proper arrangement of instructions (Azevedo, 2005) , explored the relationship between metacognitive skills and learning outcomes among university freshmen. They investigated the metacognitive strategies commonly used by the students and which strategies were helpful for their academic performance. Their findings revealed that metacognitive strategies for reading comprehension could improve college students' academic performance (Taraban , Rynerason, 2000) .

Here's a much simplified presentation of the above, to show the main differences between (Reflection, Reflexivity, Critical Reflection, Reflective Practice) terms/definitions more clearly (Wilkes, 2015) :

Table (1) *the main differences between (Reflection, Reflexivity, Critical Reflection, Reflective Practice)*

Reflection	Reflexivity	Critical Reflection	Reflective Practice
Thinking about and interpreting life experiences, beliefs or knowledge.	Thinking objectively about ourselves, our behavior, values and assumptions.	Broad contemplation to question and examine knowledge, beliefs and actions for change.	Use of reflective methods for personal and professional growth.

1.4 Flavell's model of cognitive monitoring

In his classic article "Metacognition and Cognitive Monitoring", Flavell (1979) makes the first attempt to define the components of metacognition by creating a model of cognitive monitoring/ regulation. His proposal includes four components: (a) metacognitive knowledge, (b) metacognitive experiences, (c) goals or tasks, (d) actions or strategies. A person's ability to control a wide variety of cognitive enterprises depends on the actions and interactions among these components (Mevarech , Kramarski, 1997).

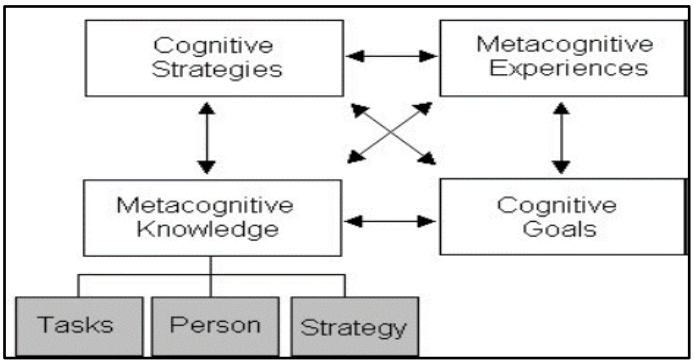

Fig (2) Flavell's model of metacognition

1.5 The MAI inventory

The Metacognitive Awareness Inventory (MAI) is a 52-item self-report with a 100 mm wide rating scale following each item (Schraw , Dennison, 1994). the MAI inventory measures different components of metacognition (e.g. procedural, declarative, and conditional knowledge of cognition; and aspects of regulation of cognition, like planning, monitoring, debugging, etc.), and it would be necessary to reduce the MAI to the items that focus on those aspects of metacognition which are strongly represented in our Reflection Assistant model.

Reflection and Metacognition in E-portfolio

Reflection on individual experience as a key to unlock the doors of learning and knowledge creation is not a new concept in education or general learning theory (Kolb, 1984). However, the best strategies to promote this type of learning environment are continually being developed. For over a decade, the use of E-portfolio has been promoted in higher education to support student learning, serving as both a product of academic coursework and as a process that supports metacognitive thinking (Clark,Eynon, 2009) Specifically, the act of reflection through E-portfolio not only allows students to review their current progress and evaluate their own skill acquisition, but also can facilitate the active process of retrieving knowledge in order to apply it to a novel situation and increase students' ability to reach higher order thinking skills, such as comparing, analyzing, and drawing conclusions on the material in which they are focusing (Oosterbaan, Stokking, 2010) .Though E-portfolio provide a great opportunity to encourage and promote high quality student reflection, such activities must take place under certain conditions to ensure that the desired outcomes truly are achieved.
(Driessen,Overeem, 2005). This mentoring role, which may take the form of a variety of roles in an academic setting, including instructor, tutor, or advisor, provides encouragement to students on their current progress, models the act of asking self-reflection questions, encourages the student to set future goals, and aids in the creation of learning plans to achieve those desired outcomes. (Pearson,Heywood, 2004) reported that students who received encouragement from their mentor were more likely to discuss the contents of the E-portfolio with the mentor and more likely to engage in reflection on the E-portfolio itself. Reflection is not a skill student will often display on their own and, even with basic prompting, they may reflect on it only at a superficial level. (Hadley, 2007) Found the role of the mentor and the role of peer mentors to be essential to encourage students to engage in deeper, more thorough reflection. Through her use of E-portfolio forums, she has created an environment where students feel safe to share with classmates their work and their personal reflection on how their work has allowed them to achieve the specific learning outcomes of their program. All students aspire to achieve these same outcomes, but each may need to take a particular path. E-portfolios may be able to address this situation, as there is evidence that E-portfolios can transform students' learning experiences by heightening student engagement (Herteis, Simmons,

2010)**,** possibly by providing structure for student metacognition (Miller,Morgan, 2009) which can improve academic performance (Tanner, 2012)**.** E-portfolios provide a structure for students to communicate their learning to others and themselves. Externalizing their learning facilitates students' ability to transfer their learning to simultaneous and subsequent learning experiences (Eynon,Gambino, 2014) Metacognition has been defined as thinking about one's own thinking or the ability to plan, monitor, and evaluate our own learning processes (Tanner, 2012) Folio-thinking facilitates students' metacognition through the reflective process of collecting evidence of their learning (Chen , Light, 2010) and an E-portfolio publicly displays students' thinking about their learning. The portfolio process, Scaffolding of reflection activities for students over time and presentation of reflection as an iterative process, instead of only encouraging reflection as a culminating activity, is another important technique and should be incorporated into E-Portfolio activities, as it can stimulate learning and allow students to achieve higher levels of achievement (Qvortrup,eiding, 2015) , promotes higher order thinking by facilitating students' analysis, synthesis, and evaluation of their learning (Herteis, Simmons, 2010)The goal of e-portfolios is to teach students how to learn and improve academic performance which occurs when students collect evidence of their learning and write about the process used to produce their work. By writing about how they produced their work, students engage in a reflective process which connects their different educational experiences and assesses the benefits of the experience and how it could be improved for the next learning opportunity. Written reflections within an E-portfolio can transform students' learning by providing a venue for them to consider their thought processes without being trapped by the idea that the correct answer is the only educational goal. Rather, students need to understand that how they problem-solve and think critically is also part of their learning, and focusing solely on the correct answer can sometimes interfere with deeper learning (Tanner, 2012) , because they may not consider the process used to arrive at a correct answer. To promote students' consideration of how they think–to improve their critical thinking– instructors need to grade students' thought processes in addition to their final products. Instructors can promote students' reflection by grading students' honest appraisal of their own work and their E-Portfolios articulation of the process used to improve their work. To become independent learners, students need to learn or understand how they think to improve their ability to (Girash, 2014) Reflection enables students to articulate how they learn, allowing them to understand their ability to connect their learning to their existing mental model (Brown et al., 2014). Reflective thinking – metacognition – is active, directed learning (Rodgers, 2002) and E-portfolios – folio-thinking – are one way to facilitate students' development of their thinking ability. Thinking about learning will facilitate students' assessment of their learning process, and an E-portfolio can enable this by making visible to students their development as a learner (Eynon,Gambino, 2014).

2. Methodology and producers

The current research was based on the following two approaches: Descriptive analytical approach: in the review of research literature, and the development of a proposed conception of the foundations and rubric for design and production of Reflective E- E-portfolio. Approach quasi - experimental: to measure the impact of Reflective E-portfolio on Metacognition Skills for Instructional Technology students.

2.1. Research problem

You can address the Problem of the Research by answering the Following main question:

"What is the proposed design of the E-portfolio form for the development of the skills of Metacognition as well as their attitudes towards for Instructional Technology students?"

The following Sub-questions are as Follows:

1. What procedural objectives necessary to develop the skills of Metacognition by design and production of Reflective E-portfolio?
2. What the Rubric for the design and production of Reflective E-portfolio for Enhancing Metacognition skills for Instructional Technology students?

2.2. Research importance:

The importance of current research are as follows: Enhancing Metacognition Skills by Using Reflective E-portfolio, Propose some of the necessary Rubric for design Reflective E-portfolio for Enhancing Metacognition skills for Instructional Technology students.

2.3. Research limits:

The current research was limited to the following limits:

Students of Instructional Technology Professional Diploma , of the pilot experiment for the academic year 2014-2015 , and Basic experiment for the academic year 2015-2016 , at Faculty of Education, Tanta University.

2.4. Research tools:

To answer the research questions, the following tools have been developed:

1. The Metacognitive Awareness Inventory (MAI).
2. Rubric List required for the design and production of Reflective E-portfolio to Enhancing Metacognition skills.
3. Rubric List for assess students Reflective E-portfolio.

3. RESULTS AND DISCUSSION

3.1 The MAI inventory Results:

Table (2) *The MAI inventory Results*

Category	Elements	Items	Mean Percent Score (29 Student)
Knowledge about Cognition	DECLARATIVE KNOWLEDGE	5,10,12,16, 17,20,32,46	90%
	PROCEDURAL KNOWLEDGE	3,14,27,33	92%
	CONDITIONAL KNOWLEDGE	15,18,26,29,35	89%
Regulation of Cognition	Planning	4,6,8,22,23, 42,45	93%
	Information Management Strategies	9,13,30,31, 37,39,41,43, 47,48	92%
	Comprehension Monitoring	1,2,11,21,28, 34,49	95%
	Debugging Strategies	25,40,44,51, 52	88%
	Evaluation	7,18,24,36, 38,49	94%

Students completed the e-portfolio Design and written reflective Essay and They had no significant differences between their The MAI inventory on the level (Sig .000) and The MAI inventory post- experiment (88.6) there were also no significant differences between the Reflective E-portfolio and Metacognition skills. It appears that the Reflective E-portfolio assignment rescued students from a poorer result on the final exam.

Table (3) *T-test Static analyzing in SPSS)*

	t	df	Sig.	Mean Difference
metapre metapost	62.9 128.7	28 28	.000 .000	67.7 88.6

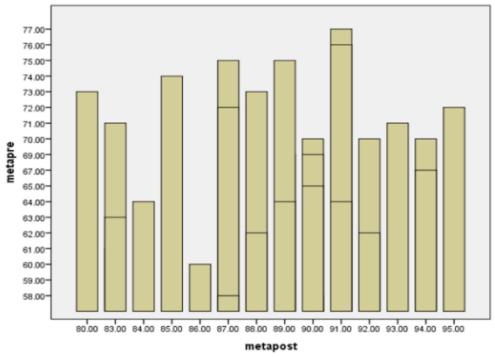

Fig (3) T-test Static analyzing in SPSS)

3.2. DISCUSSION

When the students practiced the levels of reflective thinking by writing short essay of these reflections and discussed them through brainstorming sessions, we find that this had a clear effect in the results of students in the scale of metacognition the different axis we find the following:

- KNOWLEDGE ABOUT COGNITION

1- DECLARATIVE KNOWLEDGE: **90%** Percent of Students can obtain knowledge through presentations ،demonstrations, discussions, and needs before being able to process or use critical thinking related to the topic.
2- PROCEDURAL KNOWLEDGE: **92%** Percent of Students Requires to know the process as well as when to apply process in various situations, and they can obtain knowledge through discovery, cooperative learning, and problem solving.
3- CONDITIONAL KNOWLEDGE: **89%** Percent of Students can obtain knowledge through simulation, and can be Knowledge about *when* and *why* to use learning procedures.

Regulation of Cognition

1- PLANNING: **93%** Percent of Students can be think about what he really need to learn before begin a New task, and think of several ways to solve a problem and choose the best one.
2- Information Management Strategies: **92%** Percent of Students They Skills and strategy sequences used to process information more efficiently (e.g., organizing, elaborating, summarizing, selective focusing).
3- Comprehension Monitoring: **95%** Percent of Students can be Assessment of one's learning or strategy use like pausing regularly to check my comprehension, understand important relationships, considered all options when solving a problem
4- DEBUGGING STRATEGIES: **88%** Percent of Students can be used Strategies to correct comprehension and performance errors.
5- Evaluation: **94%** Percent of Students can be Analysis their performance and strategy effectiveness after a learning episode.

6-

Conclusion

Overall, the E-portfolio assignment was well received by students, as indicated by student comments on their end of term evaluations of the Course:

- The E-Portfolio were a useful educational activity.
- E-Portfolio helped increase my knowledge of topics in this course."
- Portfolios developed my writing skills and searching along with my citing skills.
- E-Portfolio helped me connect my learning to the real world and encouraged out of class research.
- This is what linked my learning to my environment.
- The E-portfolio was interesting, helped with deeper learning and understanding

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