The Effect of (Macro/Micro) Wiki Content Organization on Developing Metacognition Skills

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Abstract: The research investigated the effects of using wiki Content organizing styles (WCOS) on developing Metacognition skills for the educational graduate students at King Abdulaziz University. A two-group experimental design was used: the first used wiki Macro content organization style (WMACO) while the second used wiki micro-content organization style (WMICO). The sample consisted of (40) students who were proficient in using the Internet and the applications of wiki, which were randomly distributed to the two experimental groups. The research instrument was a measure of metacognition skills divided into (3) axes. T-Test was used to compare between the two groups and to determine the significant differences. Findings revealed the effect of wiki macro content organization style (WMACO) on developing metacognition skills.
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Key Words: Wiki, Content Organization Style, Macro Content Organization, Micro Content Organization, metacognition skills.

Introductions:

Wiki is one of the most important Web 2.0 applications that allows a learner to build a participatory authorship (Bradley, Lindström, & Rystedt, 2010). It also provides students with the opportunity to design their own learning environment through a range of processes that emphasize social learning through participation in negotiations, discussion and peer review of educational content, as well as personalization of learning in terms of quantity and quality(Doolan, 2006).

Wiki also plays a large role in providing the learner with a range of general skills that each learner should have at least a minimum of knowledge, such as reading, writing, analysis, thinking as well as skills for collaboration, sharing and social communication(Al-halafawy & Tawfiq, 2014; Allam & Elyas, 2016; Wheeler, YEo MAn S, & WHEEl ER, 2008).

The importance of wiki is that it transforms the learner from just looking for information to the creativity and innovation in the reconstruction of learning contents(Thompson, 2007). it combines synergistic and non-synchronous interactions into a single learning entity that allows the learner to see the results of the activities and tasks that the learner implements immediately and gives him a sense of being part of a large learning community that shares content creation, This is reflected in the learner's lifelong learning environment, interaction with content, and peer exchange with peers(Ruth & Houghton, 2009). All of this has made wiki play a major role in moving the Internet from Passive Publication to Active Participation, which made the Internet one of the largest repositories of knowledge(Jokisalo & Riu, 2009).

In the context of the importance of wiki in the learning process, many studies have been launched to investigate the effectiveness of it in different educational situations. The results of Ahmad, Härdle, Klinke, & Alawadhistudy indicated the effectiveness of wiki in the teaching of Arabic language and associated activities(Ahmad, Härdle, Klinke, & Alawadhi, 2013). Farabaughstudy found that wiki facilitated reading and writing processes and the completion of learning tasks by learners, as well as helping them to work outside the classroom and to organize their own discussions(Farabaugh, 2007).

Parker & Chaostudy confirmed the effectiveness of wiki in the self-design processes of knowledge databases and building the learner's active knowledge through exchange Information and participation in collaborative tasks(Parker & Chao, 2007). Bisouxstudy aimed at teaching entrepreneurship at the University of Arizona's department of business administration based on some Web 2.0 applications, including wiki. The study emphasized the effectiveness of wiki in presenting and organizing the contents of the course as well as their effective role in developing planning and creativity skills and raising motivation to achieve new work (Bisoux, 2008). In

addition, the study of Neumann & Hood found that blended learning systems that integrate wiki with traditional education environments into one entity greatly help to develop learners' skills associated with learning outcomes as well as their development of skills collaborative work(Neumann & Hood, 2009). In a case study conducted by Huang, 2010 to identify the effects of wiki on online interactions, the study results indicated that learners 'and teachers' interactions through wiki were better than interactions provided by other Internet tools such as e-mail and forums debate, largely due to the control of learners in their learning(Huang, 2010). Hu and Johnston study aimed to design an electronic course based – wiki editor's environment through which all the topics of the course content were addressed. The results showed high effectiveness in the implementation of many activities and contents that have been discussed by the wiki editor(Hu & Johnston, 2012).

Literature review

1- Wiki concept, Characteristics and functions:

Wiki is a set of web pages designed to enable a learner to use them to share and produce content using a simple language, which is applications that create participatory websites for managing knowledge databases. According to Zeidan, Alhalafawy, Tawfiq, & Abdelhameed, participatory or wiki editors are a group of web pages that are linked together by hyperlinks and databases so that the learner can access those pages to view or add to them, and can re-edit the page. The wiki is based on a content management system that performs a number of tasks, including: enabling the learner to easily modify and add content, to give a general look to the site through the use of templates, and to monitor changes to a certain amount of content through time during editing sessions by recording changes among publications, as well as regulating the powers of learners in the use of different possibilities(Zeidan, Alhalafawy, Tawfiq, & Abdelhameed, 2015).

In a related context, Ruth & Houghton (2009, p.149) notes that wiki is characterized by collaborative processes by learners to develop shared knowledge through continuous knowledge production processes, different learning through the exchange of roles that occur among learners, sometimes they are experts and sometimes beginners, all of that work together in a framework of cooperation and not competition, and the most important feature in wiki is the retreat of the reference of the expert/teacher; the reference is participation among the learners and not only for the teacher.

The most important feature of wiki is the possibility of participation in writing, which teachers use to develop courses and various activities through content organizing in a macro or micro style, which is aimed at the current research, and then the learners to create content. These topics are limited to the teacher's ability to identify the main topics of content, and then the learners write the content of these topics in a participation way. This content is created and configured by the learners and not the teacher whose role is limited to the revision of knowledge produced by the learners.

The functions of wiki can be restricted to the following elements(Allam & Elyas, 2016; Schroeder, Minocha, & Schneider, 2010):

1. Editing-based browsing: each page of the wiki is linked to a text-editing box.
2. Access control: the editor can control the access of all learners or some of them and use its functions.
3. Editor's formatting: embedded HTML tags can be used within the engine to perform all required formats.
4. Follow successive versions: wiki allows you to save all the successive content that the learner participates in each page and make it available over the timeline.
5. Versions comparison: allows you to distinguish content changes for the same page, making it easier to compare them.
6. Back to previous versions of content: you can undo more than one step back and each step reverses a copy of edits made to the participant editor page.
7. Discussion pages: each page links the editor to a discussion page that enables learners to discuss all content.
8. Automated alerts for editing pages: editors give alerts to learners on pages that are edited or modified to attract learners to everything that is added or updated by e-mail, and news reader.
9. Stop editing: editors can close some pages and prevent further liberalization.

2- Wiki content organizing:

One of the most important variables of wiki is the variables associated with learning content organizing (CO) which refers to the organizing style of content topics to be grouped and structured according to a particular pattern, the internal and external relations between its topics that it links to other subjects to achieve the educational goals for which they were set up in the shortest possible time, with the least possible effort, at the lowest economic cost. In addition, there are many methods for organizing learning content in appropriate sequences, but all revolve around two main styles: macro learning content organization (MACO) and micro learning content organization (MICO)(Reigeluth, 1999; Tennyson & Merrill, 1971).

It is important to note that the learning content through wiki is not presented to the learners in a ready

and direct manner, but that the main elements of the editor's contents are arranged in either a macro or a micro style, allowing learners to share the each element of content. The above means that organizing the content elements where the learner controls in the order of their subject matter is either in accordance with the macro method in which the elements of the content and its topics follow from the whole to the segment, from simple to complex, from top to bottom and from the general to the most detailed, they are organized according to the macro-style, while the information that is shared divided from the part to the whole, from easy to hard, from bottom to top, and from private to public, they are organized according to the micro-style(Ben-Zvi, 2007; Diamond, 1998; Elola, 2010; Tennyson & Merrill, 1971).

According to Diamond (1998, p.125), content effectiveness greatly influences by a content organization. Content may lose its effectiveness if disorganized. Poor organization can make learning difficult, or weak learning experiences do not meet educational goals. Therefore, the field of educational technology is in constant need to investigate the variables of content organization and its components. Ben-Zvi (2007) explained that the use of participation editors to provide educational content having key determinants, including the way content, is organized within the participation editor. This organization is related to how the editor's address list is arranged, which is the main entry point for navigation within the editor's content.

Diamond (1998) states that both the macro and micro content organization styles have advantages in the process of education; the learner through macro style can understand the relationship between parts of the content, and it can understand the whole subject. The learner does not need to synthesize the links between the parts he or she has learned separately, while in the micro style the learner can sense early progress towards his goal. Education increases and trusts himself and encourages him to persevere. Thus, the current research attempts to identify the effect of the (macro/micro) content organizing style on wiki application on developing some skills and learning impact retention.

2-1-Macro Content organization style:

The Macro content organization (MACO) aimed at organizing content at the magnifying level, which is the level of organizing more than one concept, principle or educational procedure. The concept of expansion implies the addition of details, concepts, principles, and procedures that will link the information contained in the cognitive structure of the individual with the new information that will help him to produce the knowledge and to recognize its relation to the knowledge that is already directed to him(Clark & Mayer, 2016).

The overall organization of educational content requires learners to practice in a higher mental processes, to identify the main and sub-ideas of contents, as well as to link concepts, principles and procedures to each other, which helps to make the learner in a state of permanent activity and then has a positive attitudes and motives to progress in the learning process(Reigeluth, 1999).

The Macro content organization (MACO) has many advantages, including achieving meaningful learning, controlling learning and ensuring its results, contributing to the survival of the learning impact for a longer period, and helping conceptual schemes in the overall organization achieve effective educational outcomes. The macro process contributes to the understanding of new ideas. The process of synthesizing ideas and aggregating them into the overall organization provides the learner with experiences that facilitate in-depth understanding, which increases the cognitive framework of the cognitive structure, provides the learner summary with precise expertise, Relationship among subjects in educational content, and other related topics, thus achieving the principle of complementarity(Clark & Mayer, 2016).

MACO is based on three principles: First: learning from abstract general ideas and then progressing to the concrete examples; secondly, navigating from top to bottom. Finally, learning begins with a comprehensive presentation of the elements of the educational task to be organized, graduation, expansion, and detail gradually until the task is mastered, the relationship between different educational stages should be closely linked and paves the way for the next stage(Reigeluth, 1999).

2-2- Micro-Content organization style:

Micro-content organization style (MICO) in wiki comes in support gagne theory of hierarchical learning, which is based on the fact that each academic subject, or every subject in this article, has a hierarchical structure, which occupies the top of the most complex subjects or parts, followed by the least complex, simple and simplest. In the hierarchical structure, gagne has taken care to organize the educational content in a way that helps to achieve the desired goals by dividing the educational task into its simple parts and components. Then the education is in a sequence that starts from the parts to the whole and follows the hierarchy from the bottom to top. It was found that teaching the parts at the base of the pyramid helps and facilitates the learning of the most complex parts as we move to its top until we reach the completion of the teaching of the overall task(Mwanza

& Engeström, 2005; Shee & Wang, 2008; Smith & Ragan, 1996).

The content participation organization in Micro style requires the following procedural tasks(Clark & Mayer, 2016; Smith & Ragan, 1996):

1. Determining the overall educational task to be organized and learned and can be presented as a problem.
2. Dividing this task into the elements that make up and define it, which may consist of verbal information, motor skills, attitudes, mental strategies, or mental states that require the ability to discriminate or teach concepts of both material and abstract, learn principles or learn to solve problems.
3. Determining the previous requirements for each educational task element.
4. Organizing these elements and their previous requirements hierarchically beginning by learning the simple skill that is at the bottom of the hierarchy to learn the most complex skill.
5. The Micro organization is concerned with searching for sub-tasks to learn the final task.
6. Micro organization describes how to plan the performance of a task in a hierarchical process.
7. The Micro organization of learners provides a clear view of the relationships between previous learning and new learning objectives.
8. Micro organized learners can keep learning relationships in a better way as the learner tends to organize his experience and ideas according to the methods through which he learns.
9. Micro-organization helps to mainstream learning through gradual levels of performance.

3- Metacognition Skills:

The term **metacognition** means thinking about thinking or an individual's awareness of thought processes that occur during thinking, or individuals' awareness of their knowledge and thinking mechanisms, how this mechanism works, and how that awareness develops in the thinking of others(Israel, Block, Bauserman, & Kinnucan-Welsch, 2006; Veenman, Van Hout-Wolters, & Afflerbach, 2006). Israel, Block, Bauserman, & Kinnucan-Welsch (2006) defines metacognition as the thinking of learners in their thinking and their ability to use certain learning strategies appropriately.

Azevedo and his companions (1999, 44) defines it as a complex mental skill that is one of the intelligent behavior components in information processing and grows with age and experience, and is responsible for controlling all work of thinking activities directed at solving the problem(Azevedo, Behnagh, Duffy, Harley, & Trevors, 2012).

Metacognition skills are the highest levels of mental activity that keeps a person's self-awareness while thinking about solving the problem linked to the mental behavior types in understanding the problem or situation before trying to find a way to solve it, including planning, follow-up, control, assessment of the type of work and time to do so, and mental skills are effective and to the maximum extent if the interaction with others, group at times, and at the same individual level at other times.

Metacognition-based skills include planning, monitoring, controlling, and evaluation, as follows(Hartman, 2001):

1. Planning skill: the ability to propose goals, allocate specific time to study, choose the appropriate sources and strategies for learning, as well as organizing the basic elements related to a subject that is organized logically, helping to organize ideas in a reasonable sequence, and forecasting the expected results.
2. Monitoring and Controlling means the ability to summarize and self-question about task execution, linking new information with old knowledge, visualizing real applications and the ability to achieve sub-goals, leading to the main objective. This skill includes keeping the target in focus, Maintain sequence of operations, find out when a sub-goal is achieved, when to move to the next, discover and eliminate obstacles.
3. Assessment skill: it means the ability to self-evaluation of the learner to learn and how to achieve the goals efficiently and what has been achieved and what is not achieved and why? Assessment of the extent to which the objective is achieved, judgment on the accuracy of the results, assessment of the appropriateness of the methods used, as well as an assessment of how to treat with obstacles and errors, and evaluating the effectiveness and implementation of the plan.

Wiki has a significant role in the development of meta-knowledge skills which emphasized that the characteristics of editors that are based on an interactive writing technique through which knowledge is produced in a participation manner, in addition to, providing diverse opportunities for comments and appendices, these editors help to develop and support beyond-learning processes that make learners always plan what they write and put them in the spotlight for constant revision (Gobbo & Lanzarone, 2006). As Gexun and Land have argued that the social context, peer interaction, and collaboration in the implementation of tasks reflect positively on the development of learners' meta-knowledge skills, wiki is a catalyst for knowledge-based skills(Ge & Land, 2003).

Theoretical framework

The use of organization content style through wiki is based on a set of theories: structural theory sets frameworks for how to build collaborative content.

Content building is an active process that often occurs in a social context. The learner is the focus of the learning process, where he interacts with his peers in building his knowledge and experience and understanding the world around him by thinking about everything he participates. Wiki is generally one of the technologies that is based on structural concepts, their tools that encourage the idea of social communication among a group of learners sharing their knowledge and experience together with a range of problems related to the real world(Grant & Mims, 2009).

The Macro content organization (MACO) is supported by Reigeluth's Elaboration theory which dealt with the treatment and organization of sequences of educational content at the magnifying level that deals with organizing and teaching more than a concept, principle or educational procedure and based on the concepts of Gestalt principals, which sees that education occurs from all and not part, In contrast to Macro content organization, Micro content organization (MICO) is supported by hierarchical theory Which emphasizes that the basic condition of learning is the learner's possession of the basic information necessary to learn new information and knowledge Thus, the content is hierarchically followed by information from one part to the next. The argument is that the assimilation of a topic or task at a certain hierarchical level depends on the assimilation of associated tasks at simpler levels, which are tribal requirements for higher-level tasks(Grant & Mims, 2009; Reigeluth, 1999).

Research Hypotheses:

There is no statistically significant difference at 0.05 between the mean scores of the two experimental groups in the meta-knowledge skills due to the fundamental influence of the different (Macro / Micro)wiki content organization.

Methodology

1-Sample:

The sample consisted of (40) students of the educational diploma in the institute of graduate studies at King Abdulaziz University. They were divided into two groups. Each group consists of (20) students, the first group used Macro content organization and the second one used Micro-content organization.

2-Measure:

A meta-knowledge Measure has been developed. The final theme consists of (30) items divided into three axes, the first is the planning of wiki, including (12) items, the second axis, monitor and control of wiki, (10) items, the third axis, wiki calendar, (8) items .

3-Statistics:

T-Test is used to calculate group equivalence and compares between the two experimental groups in the post-application of both the achievement test and the trend scale towards technological innovations.

4-Procedures:

4-1-Analysis & Design:

After identifying the characteristics of learners and their abilities in dealing with wiki application, and defining the general objectives of the system, which focused on the development of the skills of knowledge associated with wiki. This is followed by the identification of procedural objectives, the appropriate content titles for these objectives, the strategies, and activities to be undertaken, and the main structure of the topics of wiki, whether macro or Micro organization content.

4-2-Development & implementation:

Two-wiki editor is designed, the first was organized in a macro style, while the second was micro organized, the digital content was consisted of digital texts and photographs, as well as the technical and educational reviews of editorial components. The knowledge skills scale was applied to the research sample, followed by an extensive meeting with the students to explain the nature of the experiment. Then, the participation editing processes were activated, also the implementation of communication and interaction with the learners, the motivation of the students towards editing, and finally to conduct the post-application process of the research tool, and then monitor the results for analysis.

Findings

To determine the significance of the differences between the two experimental groups, the T-test was used. Table (1) shows means, standard deviation, t-value and significant level between the two groups.

The results in Table (1), indicated that there is statistically significant differences at (0.05) between the mean scores of the two experimental group members in metacognition scale for the group that used the wiki macro content organization MACO.

Table (1): The differences significance between the two experimental groups'average scores in metacognition Scale

Group	N	Means	St Dev.	DF	T	Sign
(G1)WIKI Macro content organization (MACO)	20	185.200	3.66	38	27.06	0.00
(G2)WIKI Micro content organization (MICO)	20	125.95	2.50			

Discussion:

The results indicated the effectiveness of the macro organization (MACO) on developing the learners' meta-knowledge skills. This result may be attributed to the fact that the overall method encouraged the learners to accomplish the tasks clearly and made them able to build their knowledge with meaningful associations. Through the macro content organization, the learner is an outline of the tasks required, which means the development of the skill of planning, which is one of the most important skills of knowledge, and the writing of the learner reports. Summarizing the presentation of different simulations through the total organization makes the learner observer and master in everything he learns. For this, the macro organization requires the learner to conduct generalizations of new learning situations, which makes the learner review what he learned and restructure the accuracy of the results and adequacy, which is reflected on the skills of the knowledge beyond the learner.

The constructivist theory, which emphasizes that learning is an active constructive process rather than a process of acquiring knowledge, learning is the process that supports knowledge-building rather than communication with knowledge. It can be said that macro organization has contributed more to the learner's development in the event of continuous activity to build knowledge. The learner should plan what he will learn and observe how well he has achieved, as well as the need to evaluate everything he has learned.

Conclusion:

The results confirmed that the wiki macro organization is more effective than the micro organization in the development of meta-knowledge skills, and the future directions associated with the study of participation editors should be more closely linked to the study of the relationship between participation editing methods and a variety of learning styles for learners in stages. There is also a need to investigate the impact of the interaction between the methods of organizing participation editors and the methods of discovering these publications so that they are directed or unguided.

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