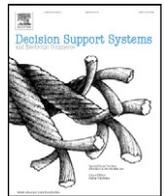




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Cognitive elaboration during wiki use in project teams: An empirical study

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ABSTRACT

Increasing research efforts attempt to understand how wikis can be used to improve team performance. Previous studies have mainly focused on the effect of the quantity of wiki use on wiki content quality in wiki-based communities. Our study focuses on the quality aspect of wiki use in a team context. We develop a construct, cognitive elaboration during wiki use, and explore its nomological network in the team context. Integrating literature on wiki and distributed cognition, we propose that cognitive elaboration during wiki use influences team performance (i.e., wiki content quality) through knowledge integration among team members. We likewise identify its team-based antecedents, including task involvement, critical norm, task reflexivity, time pressure, and process accountability by drawing on the motivated information processing literature. Furthermore, we empirically test the research model using multiple-source survey data collected from 46 wiki-based student project teams. The theoretical and practical implications of our findings are subsequently discussed.

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1. Introduction

Contemporary teams use collaborative technologies to enhance group work and achieve superior team performance [2]. Wiki, an emerging Web 2.0 collaborative technology that enables members to engage in collective editing and knowledge co-creation [32], is deployed as a popular information technology (IT) tool in supporting a variety of collective content building [32]. Numerous enterprises, such as Adobe, IBM, and Sun Microsystems, have been increasingly using wikis to facilitate collective content building [11]. However, the deployment of wikis in teams does not guarantee that such teams can build satisfactory wiki content to serve team goals. Given the crucial role of wiki in supporting a variety of content building, exerting greater research efforts is important to understand how wikis can be used to collectively build high-quality content.

Literature review indicates that our existing knowledge of wiki use and performance has been contextualized mainly in wiki-based communities (e.g., Wikipedia). For example, according to Wilkinson and Huberman [55], high-quality Wikipedia articles can be attributed to a larger number of edits. For Kittur and Kraut [28], the number of editors improves Wikipedia article quality. Although previous literature improves our knowledge of wiki, the main focus was on the *quantity of wiki use* to explain performance. Thus, a deeper understanding of the underlying factors of wiki-usage behavior that ultimately contributes to the effective content building using wiki is

necessary. We propose that studying the *quality aspect* of wiki use provides a more in-depth explanation of the quality of wiki content building by a team. We believe that previous studies have neglected this important issue.

The main objective of this study is to fill in the research gap by investigating the quality aspect of wiki use. We specifically address such aspect by developing a construct called cognitive elaboration during wiki use and examining its antecedents and team performance consequences (i.e., wiki content quality). In this paper, we identify wiki content quality as the major indicator of team performance in wiki-based project teams that use wiki for collective content building, as such endeavor is the de facto practice in these teams [32]. Wiki content quality refers to the quality of knowledge manifested in the form of wiki content that team members collectively contribute. Cognitive elaboration reflects the mental efforts that people spend in processing relevant information [10,37]. We propose that the level of cognitive elaboration expended in using wikis would influence wiki content quality in teams using wiki for collective content building. We specifically propose that cognitive elaboration during wiki use affects wiki content quality by enabling knowledge integration among team members. Furthermore, we explore its team-based antecedents by drawing on the motivated information processing literature from social psychology. In developing this construct and exploring its nomological network in the team context, our study contributes to literature by uncovering an important aspect of wiki use in the team setting.

In the following sections, we review the relevant literature on wikis, after which we provide the theoretical background of the study. We then present the research model and develop the hypotheses. Thereafter,

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we describe the research methodology, analyze the data, and report the hypotheses testing results. Finally, we discuss our research findings and its contribution to research and practice.

2. Theoretical background

2.1. Wiki research

Wikis represent a new collaborative technology that has been increasingly used to achieve various business goals [33]. A wiki is defined as “a set of linked Web pages created incrementally by a group of collaborating users” [53]. Two major technological features distinguish a wiki from other IT tools. First, unlike other widely used collaborative technologies, wiki is distinct in its ability to support “open editing” [26], a function through which everyone can concurrently edit the same wiki page. Specifically, each edit of a wiki page may improve the content to a certain extent, and any inaccurate edits can be followed up or corrected by other users. Over time, the crowd can improve the content of wiki pages, an effect viewed as the “wisdom of crowds” [46]. Second, wiki possesses the function of “edit preservation” [26], that is, each edit to a wiki page is recorded in a history page. As such, visiting previous edits or rolling back to any previous versions is easy [26]. Each wiki page has a history page that contains its history of edits, including *who* edited *what* and *when*.

As an emerging form of collaborative technology, wiki has been widely used in supporting collective content building works [33], thereby giving rise to the need to develop a better understanding of wiki use and its performance outcomes in a collective setting. After carefully reviewing the existing wiki literature, we determine that prior research mainly studied the relationship between the quantity of edits and the quality of Wikipedia articles [55]. The quantity of edits can positively influence article quality; however, “edit wars” may occur if editors have many conflicts and do not communicate well [55]. Edit wars may generate large quantity of wiki edits, but improved article quality does not necessarily follow.

This paper focuses on wiki-based teams that use wiki technology as a primary IT platform for collective content building. Such wiki-based teams differ from wiki communities in two important ways. First, only a limited number of people in a team (authorized users) can view and edit the wiki content. Second, teams using wiki to accomplish shared tasks have a relatively clear goal and timeline: they may need to finish their content building before a deadline. In this case, they may not have as much time as in public wiki scenarios to allow a large number of content iterations. Unlike Wikipedia where errors can be corrected through continuous iterations, errors in team-based wikis, if any, should be corrected before the designated deadline. Such limitation requires team members to be more careful and exert greater efforts to produce high quality edits when editing the wiki. If team members make numerous edits without thoughtful consideration, then these low quality and mindless edits may eventually damage their team performance.

Thus, we postulate that the quality aspect of wiki use plays an important role in influencing wiki content quality of such wiki-based teams. For example, team members may have different or unique opinions toward the same issues, leading them to add different content on the same wiki page. If they ignore the writings of others, the resulting wiki content would be chaotic and incoherent, reflecting fragmented pieces of different writings of people. However, if they insist on their own opinions and delete the input of others without deliberate evaluation, then such disregard might hinder effective content building. Thus, people should exert more cognitive efforts to understand the current wiki content in any improvement attempt and to achieve effective content co-creation. Team members can then determine the best means to add their own understanding in improving the wiki, based on their understanding of the current wiki content.

Unfortunately, existing literature on wiki-based communities or teams has not yet systematically investigated the quality aspect of

wiki use; this is an important research gap to address. In the following section, we conceptualize this quality aspect of wiki use by developing the notion of *cognitive elaboration* and appropriating it in the context of team-based wiki use of collective content building.

2.2. Motivated information processing theory

Cognitive elaboration refers to *the extent to which people think about and cognitively process issue-relevant information* [10,37]. This concept is a construct that reflects the varying degrees of cognitive efforts that people exert when processing received information. Individuals have a high level of cognitive elaboration if they thoughtfully process and scrutinize different pieces of relevant information to understand and assimilate it, and if they try to draw conclusions based on the systematic processing and relational consideration of all relevant information [13]. On the contrary, a low level of cognitive elaboration occurs if people superficially process information, such as ignoring relevant information or merely accepting information without cognitive processing.

While cognitive elaboration appears to focus on the individual cognitive process, the motivated information processing literature [12,13,16,17], which originates from the dual-process model [8], provides a useful lens for us to understand this construct in an interpersonal context. Drawing on the concept of cognitive elaboration, the motivated information processing literature focuses on studying how information is processed and exchanged between two individuals in negotiations to achieve mutual agreement [16]. This type of interpersonal behavior is influenced by cognitive limitations and biases, e.g., the negotiators could assume that their own thoughts and those of others are quite different [16]. These cognitive limitations and biases can hinder the achievement of integrative result. The premise underlying this line of research is that the greater care an individual exerts in exchanging and processing relevant information received from the other party, the more likely he or she will overcome human cognitive limitations and biases. In turn, this idea means that one will practice a higher level of cognitive elaboration that integrates the interests of both parties [16]. Such cognitive elaboration on the information exchanged within the dyad is underpinned by the “analytic and comprehensive treatment of judgment-relevant information” [8, p. 74]. Although different from negotiation, teamwork involves information processing and cognitive elaboration. Realizing that groups are information processors, researchers have recently begun to apply motivated information processing in a team context [13,18].

2.3. Cognitive elaboration during wiki use

Building on the notion of cognitive elaboration, we use the concept of cognitive elaboration during wiki use to determine the inherent cognitive effort that team members exert in elaborating and processing an issue-relevant information using wiki. The notion of cognitive elaboration during wiki use reflects the extent to which team members engage in cognitive elaboration using the wiki platform. Team members with high cognitive elaboration during wiki use would spend greater efforts in understanding and evaluating the current content presented in the wiki platform, determining their merits and shortcomings, and then considering ways to resolve shortcomings and improve the content using the wiki platform. On the contrary, members with low cognitive elaboration during wiki use may merely make their own edits without critically considering how these would relate to the existing wiki content.

Team members do not automatically engage in cognitive elaboration when working on wiki for collective content building. Moreover, the importance of cognitive elaboration during wiki use would not be clear unless we examine its relationship with wiki content quality. Thus, examining team-based factors that can influence cognitive elaboration during wiki use is crucial, as well as the extent and process by which cognitive elaboration during wiki use affects wiki content

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