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Version: Accepted Version

Book Section:

Breslin, D. (2018) Enhancing and managing individual and group creativity through off-task breaks. In: Kapranos, P., (ed.) The Interdisciplinary Future of Engineering Education: Breaking Through Boundaries in Teaching and Learning. Routledge, pp. 177-190. ISBN: 9781138481213.

<https://doi.org/10.4324/9781351060790>

This is an Accepted Manuscript of a book chapter published by Routledge in The Interdisciplinary Future of Engineering Education: Breaking Through Boundaries in Teaching and Learning on 07/12/2018, available online:
<http://www.routledge.com/10.4324/9781351060790>

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ENHANCING AND MANAGING INDIVIDUAL AND GROUP CREATIVITY THROUGH OFF-TASK BREAKS

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Abstract: Moments of insight have played a key role in the evolution of technology over the decades. But how can these ephemeral and enigmatic ‘eureka’ events be managed? This chapter explores the role played by off-task breaks in triggering key cognitive and social processes underpinning creativity. By breaking up the working day with low effort routine tasks and breaks, individuals can significantly enhance their creativity. So taking time away from the job becomes the key link in the creativity process. This research therefore points to the careful management of off-task breaks during the innovation process.

Key words; Creativity, Mind-Wandering, Unconscious Thought, Off-Task Breaks

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1. INTRODUCTION

In this chapter, I explore the impact of off-task breaks on the creative process in individuals and groups. Research in cognitive psychology has identified a positive link between off-task breaks and creativity (Simon, 1996; Smith, 1995). It is seen that taking time away from a problem can boost creativity, when the individual returns to the task. Some suggest that during such incubation breaks, unconscious problem-solving processes allow creative ideas to emerge (Bowers et al., 1990; Smith, 1995) through processes of association (Dijksterhuis & Nordgren, 2006; Zhong et al., 2008). Incubation thus refers to the temporary shift away from an unsolved problem to allow a solution to emerge (Wallas, 1926). Given this link between off-task breaks and creativity, some have explored further key characteristics of the incubation period. For instance, when one engages in low cognitive effort tasks during the incubation period, creativity is enhanced (Baird et al., 2012). Breaks should thus be viewed as an essential part in the creative process, as one cannot consciously think one’s ways towards a more creative outcome. Whilst past research has focused on the role played by incubation breaks in individual creativity, less focus has been paid to its role in the group creative process. Enhancing group creativity through off-task breaks is an important future endeavour in both educators and managers. The importance of breaks has important implications for our understanding of the UK productivity gap. Working

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more it seems is not the solution to increased productivity. An important lesson for UK PLC as it strives to close the gap with its European neighbours.

2. INDIVIDUAL CREATIVITY AND OFF-TASK BREAKS

2.1 The Unconscious and off-task breaks

Both a passive and an active interpretation have been put forward to explain this positive effect of off-task breaks. Adopting a passive approach, the *mental set-shifting* or *forgetting-fixation* argues that putting ideas aside can reduce associations with incorrect solutions, and allow new ones to emerge (Smith & Blankship, 1989), as the individual takes a fresh look at the problem. This passive view of incubation results in associations with incorrect solutions being reduced. So not thinking about a problem, may result in wrong heuristics and approaches becoming less accessible and being forgotten, and as a result a fresh look being given (Dijksterhuis, 2004). Other more active interpretations of incubation have emerged with the unconscious having an active role in idea processing (Koestler, 1964). Zhong et al. (2008) suggest that unconscious thought (task-related thought processes that occur while conscious attention is directed elsewhere) facilitates the discovery of remote associations, as opposed to the passive role of relaxation suggested by the forgetting-fixation or mental set-shifting hypothesis, noted above. In other words, the individual continues to think about the problem in the absence of any conscious attention (Dijksterhuis, 2004), as our unconscious mind continues to work on ideas below the level of consciousness (Wallas, 1926). Dijksterhuis (2004) proposes that with unconscious thought, disorganized sets of information become reorganized into clearer and more integrated representations of information in memory. Through a process of continued associative activity, information is clustered resulting in a more organized representation (Dijksterhuis, 2004). Therefore, Dijksterhuis and his colleagues argue that unconscious thought excels at integrating and associating information and is capable of carrying out associative searches across a broad range of background knowledge (Dijksterhuis & Nordgren, 2006). Extending this view, Zhong et al. (2008) put forward a two-step process in which, unconscious thought associates and creates the novel idea, which is then transferred to consciousness. But how can this process be managed, and crucially how can we trigger such moments of unconscious thought?

2.2 Mind Wandering and Off-Task Breaks

Recently a group of psychologists have explored in more depth the cognitive processes underpinning off-task breaks. Specifically, they have found that when one engages in low cognitive demand tasks during an incubation period, the mind wanders (Baird et al., 2012). These episodes of mind wandering enhance creativity more than if one does nothing during the break, or if one is engaged in a more cognitively demanding task (Baird et al., 2012; Sio & Ormerod, 2009; Webster et al., 2006). Baird et al. (2012) thus posit that mind wandering might enhance the process of unconscious association. On the one hand, engaging in an off-task activity allows the mind to wander, triggering unconscious associations and insight. On the other, this incubation task cannot be too cognitively demanding, as this in turns limits the working memory resources left for unconscious thinking (Smallwood and Schooler, 2006). Therefore, with simple or automatic tasks, mind wandering occurs as attention shifts from the primary task to one's memories (Smallwood and Schooler, 2006), with information processing being decoupled in a sense from the task in hand (Smallwood et al., 2003). The more repetitive and automatic the off-task activity, then the less executive control needed in performing it

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(Smallwood and Schooler, 2006). So the more routine, and automatic the incubation task, then the lower the cognitive effort needed to complete it, and the more the frequency of mind wandering should increase (Antrobus, 1968; Giambra, 1995; Smallwood et al., 2003; Smallwood et al., 2004). In summary, when an individual engages in familiar and routine tasks during off-task breaks, the greater the likelihood mindwandering will occur, and with this the associated benefits of increased creativity through unconscious through processes.

3. GROUP CREATIVITY AND OFF-TASK BREAKS

3.1 Group Creativity and Social-Cognitive Factors

Whilst past research has identified a positive link between off-task breaks and the creative process in individuals (Simon, 1996; Smith, 1995), less attention has been paid to the effect of breaks on group creativity. Do off-task breaks in which group members reflect individually on the group task improve group performance post-incubation? Do off-task breaks, in which individuals socialize together, have a positive or negative effect on the creative process in groups? Whilst the effect of breaks on individual creativity largely relates to cognitive processes, the group creative process is shaped by an interplay between cognitive, social and motivational factors (Paulus & Brown, 2007). First, the group setting allows individuals to share ideas, and to contribute towards the ideas of others. Compared to individuals working on their own, contributions from others can trigger a process of association, as individual ideas become exhausted. This process of association leads to unique combinations being generated (Dugosh, Paulus, Roland, & Yang, 2000; Paulus, 2000), and can also result in the retrieval of less common ideas (Dugosh & Paulus, 2005). Second, heightened levels of social interaction facilitate exchanges between individuals, and a back-and-forth conversation flow (Harvey, 2013; Van Oortmerssen et al., 2015). This can lead to an interaction flow (Van Oortmerssen et al., 2015) as one individual builds on the ideas of others, in a snowballing of concepts. The greater the interaction and production of ideas, the greater the opportunity for the cross fertilization of ideas noted above. Third, as individuals become more involved in the group process, through intensified social interactions, they are increasingly motivated to share and listen to the contributions of others (Paulus & Brown, 2007). These three interconnected factors thus act to facilitate the group creative process. Social forces facilitate the production of larger pools of ideas, which in turn provide the cognitive stimulation for each member to generate new ideas (Dugosh et al., 2000). Generated ideas in turn need to be noticed and attended to as members integrate them into their own knowledge systems. The more motivated members become, then the more open they are to communication, and to attending to the contributions of others (Paulus & Brown, 2007). Conversely, without motivation to attend to ideas, cognitive processes are limited, detrimentally affecting group outcomes. In this way, social forces influence the motivation of individuals to engage (Paulus & Brown, 2007). Off-task breaks can be seen to affect this interplay of social and cognitive forces in a number of ways, impacting the fluency of the creative process, and the quality of ideas generated and selected.

3.2 Individual versus Group Breaks

First breaks influence the social processes within the group, and with this, the production of ideas through interactions. Off-task breaks in which individuals reflect separately on the group task can interfere with these socialization processes, impairing the development of group cohesion and familiarity. For example, in a study of negotiation processes, Harinck & Dreu

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(2008) found that when individuals took individual breaks after a group session, they spontaneously reflected on competitive aspects of the group task. After the break, these competitive thoughts impaired collective efforts towards joint outcomes. In this same study, when groups took no break, or breaks in which they were cognitively distracted, joint outcomes post-break were improved (Harinck & Dreu, 2008). Harinck & Dreu (2008) concluded that taking individual off-task breaks is unhelpful for the group task. Competitive thoughts during these breaks act to increase self-interest, resulting in less integrative behaviors after the break (Harinck & Dreu, 2008). Following this line of argument, individual breaks are seen to interfere with the process of socialization occurring in groups (Breslin, 2018a). This constrains the interaction of group members post-break, and with this the creative fluency, or total number of ideas generated, in the group (Paulus, 2000).

Second, breaks interfere with the cognitive processes underpinning group creativity. It has been argued that breaks, in which group members individually reflect on the task following the group activity, can allow the individual to integrate ideas from the group session with their own generated ideas, resulting in new ideas and combinations of ideas post incubation (Dugosh et al., 2000; Paulus & Yang, 2000). Off-task breaks thus allow time for individuals to process ideas from the group. Paulus et al. (1995) however found no difference in performance between cases in which individual breaks followed group creative tasks, and cases where group breaks followed individual creative exercises. This would suggest that the cognitive benefits derived from individual breaks following the group creative process are questionable. When one considers the group process, there is an interplay between the socialization processes noted above and key cognitive processes underpinning group creativity (Paulus & Brown, 2007). In this manner, intensifying the degree of social interaction and participation can be seen to also increase the quality of those ideas generated. As individual off-task breaks impair the process of socialization within the group, the generation of ideas through interaction is constrained, and with this the opportunity for members to attend to and build on the contributions of others. Following this argument, Breslin (2018a) argued that the quality of ideas is decreased post-break, in groups where individuals are alone during the break, relative to the no break case. Therefore, this research suggests that off-task breaks in which individuals engage in separate individual activities have a detrimental impact on group creativity (Breslin, 2018a). The key therefore in group tasks is to take breaks together.

3.3 Group Processes and Naturally Occurring Breaks

The activities of groups develop over time in pace with other time-based cycles including personal, organizational and institutional cycles. For example, in an education environment, group tasks follow assignment deadlines, tutorial timetables and tutor engagement sessions. In an industrial setting, group processes follow product development cycles, project management stages, annual budgeting cycles etc. The synchronisation of groups processes with other external temporal patterns is known as entrainment. These cycles of activity vary from daily routines to broader monthly and annual calendars. On the one hand temporal entrainment can trap or lock a group into a routine, making it difficult to schedule the off-task breaks needed to trigger creativity. On the other hand, entrainment naturally identifies pauses or interruptions in time cycles, that groups can use to “stop and think” about their work progress (Okhuysen, 2001), and maximise opportunities for change (Zellmer-Bruhn et al., 2004). The more a group works together, and the more familiar they are with each other, then the greater the probability that they

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will use interruptions (Okhuysen, 2001). Indeed, Breslin (2014) found that as groups develop over time, they generate more ideas and spend more time in divergent thought when completing group creativity exercises. Familiarity can lead to interruptions in three ways (Okhuysen, 2001). First social norms within the group may encourage interruptions aimed at diffusing tensions or building bonds. Second as the group know each other, there is less chance for negative reaction if someone interrupts work, by for example joking or clowning around. Third familiar groups can express disagreements without the risk of escalation. In summary, group processes naturally follow cycles of entrainment with other temporal rhythms occurring at the level of the individual, organization or wider institution. These cycles lead to distinct pauses or interruptions, which create opportunities for off-task breaks and creativity. Furthermore, the familiarity develops within the group, then the greater the probability such pauses will naturally occur.

4. THE TIME OF THE DAY EFFECT

4.1 Individual Creativity and Time-of-Day

Finally, when considering the effect of breaks, attention must be paid to the time-of-day effect. Past research has shown that an individual's behavioural and cognitive function changes over the course of the day. This circadian rhythm is linked to physiological changes in body temperature and hormone production over the course of the day. The circadian rhythms of individuals differ between morning and evening types, which are termed chronotypes. Morning types wake up early, are more active in the morning and go to bed earlier in the evening. Evening types are less active in the morning, staying awake later in the night. The distribution of morning and evening types varies with age. For instance, children tend to shift from morning to evening types as they reach adolescence (Kim et al., 2002; Roenneberg et al., 2004). This prominence of evening types continues into young college age adults, reversing back to morning types in older generations (Adan and Alnirall, 1990; Giampietro and Cavallera, 2007; Intons-Peterson et al., 1998; May and Hasher, 1998). Scholars have explored time of day effects on cognitive functions associated with the creative process. May and Hasher (1998) focused on the notion of inhibitory processes, which control the flow of information from thought and perception (e.g., Hasher et al., 1999), and thus act to suppress the processing of distracting or task unrelated information. Inhibition has a number of effects on information processing (Hasher et al., 1999; May and Hasher, 1998), by restricting attention to only relevant, task-oriented stimuli, suppressing information that was but is no longer relevant to the task, and restraining the production of strong responses. These three inhibitory functions may be impaired at off-peak relative to peak times (May, 1999). Wieth and Zacks (2011) showed that reduced attentional control at a non-optimal time of day, can positively affect performance on insight problems. Specifically, they argue that when evening types perform better at insight problems in the morning, which is their non-optimal time of day (Wieth and Zacks, 2011). They therefore point to a relationship between cognitive performance and an individual's circadian arousal. Others similarly showed that individuals were less able to ignore additional distracting information during their non-optimal time of day compared to their optimal time of day (Breslin, 2018b; May, 1999; May et al., 2005). In summary, the effectiveness of off-task breaks on individual creativity would seem to depend on the time at which such pauses were scheduled.

4.2 Group Creativity and Time-of-Day

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When considering socialization processes in groups, previous research has found a link between variations over time and individual circadian rhythms. Morning types for instance, who have an energy peak during the working day, are seen to be more conscientious (Jackson & Gerard, 1996), reflecting a dutiful/conformist personality style (Diaz-Morales, 2007). DeYoung et al. (2007) found a link between morning types and stability, as represented by neuroticism (reversed), agreeableness, and conscientiousness. Randler (2009) further links morning types and proactivity. Morning types are also seen to prefer social values (conservation, self-transcendence) over individual values (Vollmer & Randler, 2012), and tend towards cultural collectivism and with a low tolerance of ambiguity (Fabbri et al., 2007) conforming more to social laws and norms. When one considers processes of socialization, morning types would thus seem to be key players in collective activities, working towards group goals and critical actors in team building exercises. Morning types are early risers, and so begin the working day in synch with their individual biological clocks. This alignment between individual and social rhythms, might extend to a wider alignment between individual and social behaviors and values (Vollmer & Randler, 2012) over the course of the working day. Therefore, an apparent tendency towards conformance and conscientiousness within this group may be reflective of a synchronization between individual and collective diurnal rhythms. While morning types are associated with social traits such as conformance, conscientiousness, and agreeableness, some suggest that evening types exhibit behaviors which reflect more problems in coping with social demands than morning types (Mecacci & Rocchetti, 1998). Vollmer and Randler (2012) found that evening type adolescents had a greater preference for individual values (openness to change, self-enhancement) rather than social values. Vollmer and Randler (2012) further argue that because evening types struggle to comply with early social schedules, they often decide against pro-social behaviors of getting up early. As a result they are less likely to conform to wider social constraints. This misalignment between social and biological times can result in a ‘social jetlag’ (Wittmann et al., 2006), which can lead to less proactivity than morning types (Randler, 2009), and even anxiety as evening types are expected to perform tasks during their non-optimal time of day (Diaz-Morales & Sanchez-Lopez, 2008). Interestingly evening types have also been associated with different cognitive styles (see below), having a higher ability to think creatively (Fabbri et al., 2007; Giampietro & Cavallera, 2007), being more intuitive and more likely to have an unconventional/dissenting personality style (Diaz-Morales, 2007). Evening types are thus seen to be intuitive, impulsive, and creative, inclined toward cultural individualism and with high tolerance of ambiguity (Fabbri et al., 2007). While the pro-social behaviors of morning types may reflect the synchronization between their individual biological clocks and social rhythms, the more individualistic behaviors of evening types likewise reflects a mismatch between the two.

In addition to chronotype, key processes of socialization may depend on levels of motivation, energy and alertness that alter over the course of the day depending on the individual’s body clock or circadian rhythm. For example, Hasler et al. (2008) found that behaviors associated with positive affect (socializing, laughing, and singing) varied according to circadian rhythms. In this latter study it was seen that individuals peaked in terms of behaviors such as laughing and socialization, between 8 and 10 hours after they woke. Clearly if these peaks occur during the working day (as in the case of morning types) then such individuals may exhibit higher levels of pro-social behaviors. Evidence from this research would thus suggest that when an individual’s body clock is out of synch with the timing of the task in hand, then the individual concerned may

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behave in a more individualistic manner. These less pro-social behaviors might negatively impact upon the group creative process in a number of ways. First, conversations within the group can become dominated by one person effectively blocking comments from other members (Nijstad et al., 2002; Rietzschel et al., 2006). Second, free riding may occur, where some individuals sit back and contribute less, or engage in social loafing as they don't feel accountable as individuals (Karau & Williams, 1993). Finally, during non-optimal times of day the individual may feel more apprehensive about negative evaluations by others, and as a result feel inhibited to express ideas due to social anxiety (Camacho & Paulus, 1995; Rietzschel et al., 2006).

On the other hand, heightened levels of social interaction experienced during an individual's daily peak, can enhance the creative process by facilitating exchanges between individuals. In this manner, individuals build on the contributions of others leading to back-and-forth conversations (Harvey, 2013; Van Oortmerssen et al., 2015), as one idea triggers further associations in a snowballing of responses. With increased levels of interaction among team members, group members stimulate further ideas between themselves, leading to a process of cross-fertilization (Nijstad & Drue, 2002; Paulus et al., 2000). The more individuals are exposed to the ideas of others, then the more this process of cognitive stimulation occurs (Paulus and Yang, 2000). As a result, one would expect the number of ideas generated to increase, as socialization within the group intensifies during daily peaks. Breslin (2018b) found that student groups reached a creative peak around the lunchtime period, despite individual differences in chronotype. During this lunchtime peak, groups were twice as productive creatively than first thing in the morning, or during the afternoon post-lunch period (Breslin, 2018b).

5. MANAGING OFF-TASK BREAKS

In light of this review of recent literature, educators and managers should look towards enhancing and managing the creative process in individuals and groups through off-task breaks. Breaks should be seen not as an impediment to productivity, but an essential element in the creative process. First educators and managers need to be more aware of the opportunities created by breaks (Zellmer-Bruhn et al., 2004). Staudenmayer et al. (2002) for instance found that engineers and managers did not recognize the potential for change in interruptions. Second management need to set expectations for change, adaptation and creativity within groups during breaks (Staudenmayer et al., 2002; Zellmer-Bruhn et al., 2004). Third and reflecting on the research noted above, guidance can be given on how to structure daily group activities, in terms of the nature, duration, frequency and timing of off-task breaks. In this way, groups can learn to manage the process and maximize benefits for the ongoing needs of the organisation.

5.1 The nature of the off-task break

When considering individual creativity, the type of off-task break completed has an important influence on incidences of mind-wandering, with past experimental work looking at the impact on creativity of different incubation tasks from high cognitive demand (e.g. counting backwards, visual memory tests) to low cognitive demand (e.g. reading) (Sio and Ormerod, 2009). As noted above, when task demands are high, idle cognitive processes and with this mind wandering events, are reduced. On the other hand, when routine and habitual tasks are completed in a repetitive and automatic manner, mind-wandering processes are triggered. Therefore, it is important to identify tasks which are repeated routinely within the daily rhythms of the group,

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such as eating, reading, going for a walk. Research has shown how renowned creative individuals develop and stick to rigid daily routines, in which their periods of work and interspersed with off task breaks in which they go for a walk, socialize with friends etc. (Currey, 2013). Engaging in these low effort activities enhances opportunities for mind-wandering, and with this insight. When considering the group creative process, collaborative group breaks are seen to increase the quality of the creative process, relative to individual breaks, no breaks or more competitive group breaks (Breslin, 2018a). Breslin (2018a) thus calls for groups to engage in participative activities during breaks, in which each member is encouraged to get involved. In other words, more of a Swedish Fika coffee break and a race in the park!

5.2 The duration and frequency of off-task breaks

The length of the off-task break can also have an effect on mind-wandering and with this creativity (Sio and Ormerod, 2009). Sio and Ormerod (2009) argue that with a long preparation period in which an impasse has been reached, incubation effects can have a positive effect on creative problems. In these cases, a strategic shift in restructuring the problem is achieved during incubation. However, there is no standard on what is considered a long or short incubation period. For instance, Smith and Blankenship (1989) consider 15-min a long incubation period. The length of the incubation might also be considered relative to the preparation time worked on the problem before incubation. There has been little prior research which has explored the effects of frequency of off-tasks breaks and creativity. For instance, is it beneficial to develop repeated periods of problem-solving-incubation-selection on the same problem over time, or are fewer extended problem-solving-incubation-selection sequences better? Future research might also investigate these three areas by tracking individuals over a period of time. In this way, a more fine-grained assessment of the immediate impact of task type, incubation period and incubation frequency on the group creative process. Self-reports of behaviour can include diary (beeper) methods in which the individual records the frequency, sequence, and duration of behaviours during the day. These logs might be further supported by observations, or through shadowing activities.

5.3 Individual or group off-task breaks

As noted above, when groups take breaks it is important that they take these breaks together (Breslin, 2018a). By splitting up and taking breaks individually, important socialization processes are interrupted which impair social, cognitive and motivational factors underpinning group creativity (Paulus and Brown, 2007). The key issue with group breaks is to engage all members together in the off-task activity (Breslin, 2018a). In this manner, both the fluency of the creative process and quality of ideas generated is facilitated and even enhanced by additional group forming activities during the break.

5.4 The timing of off-task breaks

In light of recent research which points to a link between creativity and an individual's non-optimal time-of-day (May, 1999; May and Hasher, 1998; Wieth and Zacks, 2011), the benefits of off-task breaks might be maximised when taken during these times. Individuals can thus identify when occurrences of mind wandering and with this insight are more likely to occur. In conclusion, it is argued here that off-task breaks are likely to be more effective when they coincide with the individual's non-optimal time-of-day. As the individual is more likely to be distracted during these periods, then opportunities for mind-wandering and with this insight are

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increased. When considering groups, the lunchtime period is seen to be the most productive (Breslin, 2018b). Therefore, scheduling activities between 11am and 2pm doubles creative productive relative to the early morning or late afternoon. In addition, the mix of chronotypes across members introduces an important element of diversity which in itself may further enhance the creative process (Volk et al., 2017). Future research might explore the notion of group chronotype diversity. Volk et al (2017) suggest that when teams understand chronotype diversity, they can enhance performance by altering the timing and pacing of their work to match the different energy peaks of group members. Equally team performance can be impaired if chronotype differences among members are not recognized and understood within the group (Volk et al., 2017). As noted above, future research might be designed to create and investigate groups with different levels of chronotype diversity.

In summary, individuals and groups should seek to organize their day to get the most out of off-task breaks. The exact timing, duration, frequency and nature of these breaks may change depending on the complexity of the problem being worked on. As noted above, the more complex the problem, then the more frequent and longer breaks should become. In addition, it is noted that groups in which individuals are familiar with each other are more effective self-organisers when organising breaks (Okhuysen, 2001). Indeed, Okhuysen (2001) found that when pauses are imposed by management the adaptiveness of the group decreases. Therefore, while educators and managers understand the importance of breaks, and set the agenda for these incubation periods (Staudenmayer et al., 2002; Zellmer-Bruhn et al., 2004), micro-level organization needs to be managed by the group itself.

6. CONCLUSION

Given the role played by the unconscious in creative thought, one clearly cannot manage the direction of thought patterns that emerge. However, one can manage the overall creative process, through the careful management of these unconscious moments. Therefore, walking away from the job is no longer seen as unproductive, but a key element in the creative process. This will involve educating educators and managers, and to change the mindset of time-keeping administrators on the importance of breaks. Breaks should no longer be viewed as instances in which employees 'slack off', but as an essential and critical part of the creative process in groups.

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