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Learning across contexts: How students regulate their learning in an informal context

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Full Paper
Abstract

Primary school learners are often engaging in learning opportunities in both inside and outside of school contexts. To understand how these different contexts afford opportunities for metacognition and self-regulation, we follow local primary school students of elementary grades five and six. In Vygotsky’s work, metacognition appears as an awareness of one’s own thinking processes and the way they can be controlled and directed. For Vygotsky, metacognition and self-regulation are completely intertwined in which the latter takes the forms of control over one’s attention, thoughts, and actions (Fox & Riconscente, 2008). Consequently, the understanding of these important constructs supports the understanding of human behavior, learning, and development within a broader context of all human activities. To explore the learning of metacognition and self-regulation in students’ learning, we draw data from an informal context: a primary school, co-curricular activities (CCA), in bowling. Interpreting from a variety of data-collection techniques such as field observations, interviews, field notes, and video recording, the research team has been observing the bowling team’s practices at least once a week since January 2010. Although the school’s team comprises of more than thirty students, we targeted our observations to nine of these students. A further sub-section of two participants were selected and interviews were conducted to collect information on strategic planning, self-efficacy, and knowledge application. Moreover, artifacts such as written statements of the way their families assisted in their learning in an informal context were also collected. Preliminary findings indicate that learning in an informal context affords opportunities for metacognition and self-regulation in interesting and authentic ways. In addition, students point out that learning strategies can be used in both formal and informal contexts. The findings also illustrate the importance of linking students’ development of metacognitive abilities to parental mentoring in providing a fuller understanding of their learning in both formal and informal contexts.
Introduction

"Must still keep your mental calm and try to do better the next shot. And don't keep thinking about the bad frame. Each game of bowling is made up of 10 frames. Each frame entitles the bowler up to two attempts to knock down ten pins; Just look forward to the next round." (Mark)

I keep a notebook so you have notes and stuff, so if there is a spare (A spare indicates that all of the pins have been knocked down after the second ball of a frame), and you don't know what line to use them, just refer to the notebook. (Jay)

The two eleven-year-old primary school boys who were quoted above are reflecting on their learning in an informal context and their strategies for gaining expertise. Their descriptions suggest that they move toward attainment of their goals with the engagement of self regulatory behavior; while Mark demonstrates regulation of one's emotion, Jay monitors his learning through the use of a note book. These learners demonstrate that learning in an informal context requires more than compliance with prior directions (in cases whereby their school coaches would give specific bowling instruction to prepare students for their participation in various private bowling clubs due to differences in lane conditions); it also involves controlling, monitoring, and taking responsibility for one's own learning processes. Metacognition is often described as conscious control, active monitoring, and regulation of learning processes (Flavel 1987; Baird & White, 1996; Larkin 2006). This article aims to investigate the impact of broader informal learning experiences on students' metacognition and self-regulation as there is compelling evidence from formal classroom suggesting that students who are more metacognitive can improve their learning and while becoming more empowered learners (Baird, 1986). Learning in formal classrooms provides students with the knowledge and skills that they need to become contributing citizen in a society. However, the importance of redirecting focus and attention upon contexts other than the classroom where students learn through participation in the communities and practices help to capture learning experiences and the understanding of different contexts and practices over time (Biesta, 2008). To shift away from class-room centric focus, the research emphasizes one particular setting, the
co-curricular activities (CCA) in bowling, and on the metacognitive learning afforded by this informal setting.

**Metacognition and Self-regulation**

The term "metacognition" is most often associated with the cognitive information-processing tradition represented by the early work of John Flavell (1979) and Ann Brown (1987). Metacognition was originally referred to as the knowledge about and regulation of one's activities in learning processes (Veenman, Van Hout-Wolters, & Afflerbach, 2006). A review of seminal works in the field reveals that there appears to be no uniform definition of metacognition in the literature (Larkin, 2006). For instance, Kuhn, Amsel, and O’Loughlin (1988) view metacognition in terms of students’ ability to not only think with their ideas (knowledge), but about their ideas (knowledge). Gunstone (1994) considers metacognition as a combination of student knowledge, awareness, and control relevant to their learning. Moreover, White (1992) and Costa (1991) place emphasis on evaluation which represents another aspect or dimension of metacognition. Furthermore, Fox and Riconscente (2008) note that historical precursors of metacognition (along with self-regulation, and self-regulated learning) appear in the writings of James, Piaget, and Vygotsky, however, contemporary research has been heavily influenced by Flavell in the area of metacognition (Schunk, 2008). Being one of the earliest contributors to the conceptualization of metacognition, Flavell laid the contemporary foundations for metacognition. Flavell describes the conceptual definition of metacognition as “thinking about thinking” (Miller, Kessel, & Flavell, 1970), he further operationalizes metacognition into four key areas: metacognitive knowledge, metacognitive experience, goals, and the activation of strategies. At a broader level, the foundation of metacognition is in the mind of the individual. Further, Baker and Brown (1984) separated metacognition into two distinct elements: knowledge about cognition (monitoring) and self-regulatory mechanism that contain monitoring as a central focus. The self-regulatory mechanism included checking the outcome, planning, monitoring effectiveness, testing, revising, and evaluating strategies (Dinsmore, Alexander, & Loughlin, 2008). Moreover, the term “self-regulation” derives from the socio-cultural
tradition founded on the work of the Russian psychologist, Lev Vygotsky (1978, 1986). In Vygotsky’s account of historically situated and culturally determined human behavior, self-regulation and metacognition are central to human development driven by language-based social interactions. For Vygotsky, self-regulation is an essential characteristic of human behavior; it takes the form of deliberate control of one’s own attention, thoughts, and actions (Fox & Riconscente, 2008). According to Dinsmore et al (2008), contemporary self-regulation research has been heavily influenced by the work of Albert Bandura. Bandura (1986) incorporated self-regulation into his social cognitive theory of human behavior. He views self-regulation as the process of influencing the external environment by engaging in the functions of self-observation, self-judgement, and self-reaction (Schunk, 2008). Schunk (1994) defines self-regulation as students’ self-generated thoughts, feelings, and actions, which are systematically oriented toward attainment of their goals. In this article, we have adopted Vygotsky’s model in which metacognition forming the cognitive parts of self-regulations, which also encompasses affective, self-efficacy, and social elements. Furthermore, both terms metacognition and self-regulation are used to identify multiple-dimensions of the two constructs which continue to be represented in the research literature. For instance, many researchers have argued that sport expertise also depends on learned cognitive processes and behaviors (Hodges & Staarkes, 1996; Paull & Glencross, 1997; Willimans & Davids, 1995). An expert tennis coach, who worked with world highly ranked players, described the advantages of metacognitive process along with motivational benefits such as attributions to strategy use (Zimmerman & Moylan, 2009). However, much less is known about the processes individuals are using during practice sessions, and what types of processes could benefit or impact the effectiveness of learners’ performance. Based on the above synthesis, in this article, we focus on one particular setting, that of CCA with primary students in bowling in order to explore the different dimensions of metacognition and self-regulation afforded by this informal context.
Methods

To explore metacognition and self-regulation in the context of bowling, the research involves the collaboration of a Singapore primary school with students from elementary five and six. The primary school bowling team consists of more than thirty students. To capture the breadth and depth of students' experiences as they engaged in various aspects of training, this study targeted at two groups of the school team, which consisted of nine students. The teams practiced after regular class time, two hours a day, and three days a week. In addition, a further sub-section of two participants, one from elementary five and another from elementary six, were selected for regular interviews. There are two coaches for the bowling team, and they varied somewhat in their coaching experience. For example, Alex has more coaching experience than his assistant Victor, but both of them engaged in direct interaction and instruction with the learners.

The study drew on a variety of research methods including field observations, informal open-ended interviews, video-recording, field notes, and informal conversations with students, coaches, and parents during practice. Observations occurred regularly at least once a week beginning from January 2010. Students were interviewed with questions focused on individual's learning strategies, peers' learning approaches, and key learning experiences. Interviews were audiotaped and then transcribed. Moreover, we collected artifacts produced by students, like written statements of the ways their families assisted their learning in an informal context. The data analysis process was iterative and started early in the course of the study as we discussed observations, analyzed transcripts, and identified changes in students’ thinking and learning approaches.

After the initial weeks of observation, we identified two bowlers (both boys) that we thought represented the profiles of potential athletes as in their dedication to the sport. Both participants shared a common characteristic in which their parents (especially their fathers) played a prominent role in assisting their boys to excel in their learning. During school practice and competitions, we paid special attention to these two boys and conducted extra interviews with them during the course of this study. In short, we draw from these students’ experiences to represent aspects of metacognitive activities.
Findings

The research aimed to capture how an informal learning context such as the CCA activity, bowling, affords opportunities for students to understand the significance of their engagement in metacognition and self-regulatory activities. In this section, we present the findings from our analysis of the two groups of participants including individual interviews conducted with two selected participants. The first part, *engagement in self-regulatory processes*, focuses on the two groups of students’ experiences of metacognitive control, metacognitive monitoring, strategies selection, and help-seeking behavior. The second part, *a closer examination of metacognitive and self-regulatory processes within a case study*, presents the first case study of a primary five student who engages in goal setting strategy and knowledge application in different contexts. Finally, the third part, *the mentoring process of metacognitive and self-regulatory learning*, highlights the second case study of a primary six student who involves in the metacognitive processes with assistance from his father.

I. Engagement in metacognitive and self-regulatory processes with two groups of students

The two groups of participants from the school team that we interviewed commented on their learning approaches and experience learned from participation in school practice and competitions. Most students demonstrate some form of metacognitive control, which help them to exercise strategic judgment about ‘what works’ in the patterns of their performance. Note that in the transcript, parentheses denote explanations:

Yeah, because you know, like if you get a bad frame (*Each game of bowling is made up of 10 frames. Each frame entitles the bowler up to two attempts to knock down ten pins*), and you bowl, the next frame you feel negative but you must tell yourself positive. Then you can do it. (Jay)

Yeah, you must apply like, whatever you win or do well in a tournament, you must always remember what you did and try to do it in the next tournament. But if you do not succeed then it’s okay, because once in a while, life has ups and downs. (Mark)
Because when I bowl first game, I very concentrate, then after that, middle, I start to lose concentration...in the middle then the last game, I will put all my effort to go back. (Benjamin)

Also, students indicate metacognitive monitoring of their errors with the use of note-taking as a way to learn from their errors and avoid consequences of not knowing how to correct errors and experience failures:

I think it’ll be easier to write it down so that you won’t forget the things that you tried but failed...but I didn’t do that for two weeks. (Thomas)

Yeah, I take, I will jot in the notes then I will...and after that, I put in my bag, then I read, if I get that wrong, I read again until I get it back. (Dixon)

Taking down notes like, when the lane gets dry then you write down your strategy. (Rick)

However, not all students find that accurate records of what they have done can improve performance and provide cues for ways to improve expertise:

Not really...lazy. (Benjamin)

Students state that the experience of going through a bowling competition can be more stressful than academic examinations due to the fact that everyone in the bowling alley is watching how the bowler is performing. To overcome irritableness and nervousness, students select strategies they consider effective in helping them to perform productively during competition:

Listen to music... (During competitions, students are allowed to take a seat with earphones on while waiting for their turns to bowl). (Benjamin)

You cannot be pressured, because if you are pressured, because everybody’s pin fall, so if you’re pressured then if you like grip the ball a bit more then the ball will start doing things that you don’t want it to do, and then that’s where probably you lose out. And when you’re taking spares, you must not be...you don’t want to get over things quickly, although you strike...yeah you must be slow...slowly take the spares down. (Mark)
Finally, some students note that help-seeking from their coaches should be the last resource as experimenting through learning and fine tuning is more challenging:

Must be independent, yeah, you cannot rely so much on like somebody… (Jay)

No, you need to experiment it yourself. Or you can call coaches if you really, really, really need help. But otherwise, most of the time, we try to do it ourselves. If we cannot, then, we'll ask coaches. (Mark)

In this section, we have highlighted the processes of informal learning and the way in which it provides opportunities for metacognitive activities. While we recognize the potential of informal learning as an opportunity for students to engage in metacognition and self-regulation, we would like to emphasize that these skills and capabilities can be learned and practiced in both informal and formal contexts or interchangeably.

II. A closer examination of metacognitive and self-regulatory processes within a case study

Research by Zimmerman & Moylan (2009) has revealed that novices attempt to self-regulate their learning in some way. In this section, we present the first case study of Dixon, a primary five student who engages in certain dimensions of metacognition and self-regulatory activities. Dixon demonstrates that he is able to apply goal setting strategy effectively and to make connection between learning in bowling and classroom as a way to improve on his formal and informal learning endeavor. Note that in the transcript, parentheses denote explanations:

Yeah, must have a goal. Example, if you want to win a tournament then you must have high score right? You want to get high score, you must strike a goal, I mean like, every each game you must get 200. If you never get 200 then try the next game. (Dixon)

So I can get more medals, for example like happy like that. So when the coach see I bowl very good right, I mean the national coach see that I’m very good, then later if you’re lucky the coach will like, the coach will see your results and the coach will pick you up for going to the national
team (Dixon set his performance goal at 200 for each game, in this excerpt, he is explaining that if he can reach these goals, he then will be able to participate fully in the tournament and win medals for events in singles, doubles, team, in addition to masters. Eventually, his goal setting strategy may even bring opportunity for him to becoming a national player). (Dixon)

To achieve his goals, Dixon demonstrates aspects of metacognitive controlling, monitoring, and help seeking behaviors such as simply asking the head coach for help when having difficulties in reading lane conditions:

The mindset that means like, example, alah I can actually fail...that means not to say that in your mindset, must say must achieve this, must achieve this. Must try and try and try. That your mindset must be like a good thinking. (Dixon)

No, I didn’t talk to myself, I like, the people in the, like for example like Mark, Jay encouraged me. Don’t cry lah...come on...come on...this is just the first game. And later I thought to myself that must be happy, must be happy, must be happy. Must be happy, regardless of my fever. (Dixon)

First thing, important in masters when we first throw, first throw already right, after that, example, your ball over-hooked, you must ask our coach. So our coach can help us the first important thing. For example, if your lane is very dry, very dry then you over-hooked, ask your coach, move where, move where? But if you already know that your coach teaches you, you can adjust yourself to follow the lane conditions. (Dixon)

These individual interviews with Dixon provided evidence of the different ways in which a learner was able to self-regulate his learning experiences in an informal context. Next, we analyze an aspect of self-efficacy, which is self-efficacy calibration. Calibration is a measure of metacognitive monitoring based on the disparity between one’s sense of efficacy about performing a particular task and one’s actual performance (Zimmerman & Moylan, 2009). Dixon’s is accurate in judging his capability to perform and thus learn more effectively. His self-efficacy judgement does not exceed his actual capability as over-optimism can lead to insufficient efforts to learn:
My normal average now is about 155 for the whole year. Not for the, sometimes the game, that one sometimes game. 155 and above. (Dixon)

Last year my average was about, total was 139. (Dixon)

Sure (Dixon indicates that his last year average was 139, this year average is 155, and he thinks that next year average would be 170. Dixon demonstrates accurate metacognitive monitoring of his actual capability and performance. (Dixon)

Interestingly, Dixon points out that if one is good at bowling, one must be very good at studies too, and he thinks that there is a connection between bowling and classroom study:

Example like, achievement goals like are goals, like example last year if your score is 70 something, this year you must get, this year I want to get 80 and above, get one, like that (Dixon is relating the examples of setting incremental goals from bowling to classroom study in which last year score for a subject was 70, and this year score for a subject can be 80). (Dixon)

Dixon's efforts presented in the above example provide an indication of knowledge application from one context to another. He raises interesting examples of how learning can be related and even intertwined between different settings.

III. The mentoring process of metacognitive and self-regulatory learning

This section presents the second case study involving Nathan, a primary six student and his engagement in metacognitive and self-regulatory activities with assistance from his father. In the bowling practices, parental involvements are regular. Most parents almost always attended the practices and competitions in order to assist their children's performance or cheer from the audience seats. Nathan's father holds an academic position in a local university. Although his work and schedule put a certain pressure on his time and availability, he attended interviews with Nathan and actively participated during the meeting sessions. The excerpt below identifies the father's role as an important mentor who assists Nathan in monitoring his learning:
Father: Okay. You feel that you must pick up your spares.
Nathan: Yeah.
Father: What else do you think you must do?
Nathan: Train hard?
Father: Train hard; Let me write down on the whiteboard, okay. So you can remember, okay. Never mind it’s alright. So the first thing you need to do is that you need to be determined…
Father: To work hard. Anything else? What about accuracy?
Nathan: Of course, accuracy. I almost forgot you have to be very consistent unlike me (Laughs).
Father: Okay, so to be consistent…
Nathan: Consistent in your shots because every shot counts.
Father: Every shot counts.
Nathan: In a competition (Laughs).
Father: Okay, don’t waste your time, okay. Any other thing that you feel that is necessary?
Nathan: Your goal.
Father: So, goal is necessary, okay.
Nathan: Wait, determination and confidence must be, especially when you are feeling down and your scores are bad.
Father: When…
Nathan: When you are going to give up.
Father: You are feeling…
Nathan: Wait, wait. No, no. Not feeling down. Going to give up. Some people when they are going to give up they don’t feel…
Father: Okay, when they are going to give up, okay. Give up, okay. Anything else? Do you think you’ll be doing all these from now till next year?
Nathan: Wait, wait, wait. Actually the atmosphere is very important.
Father: Well you can’t do anything about the atmosphere right?
Father: Okay, you got to overcome, to overcome…
Nathan: Overcome the bowling centre atmosphere…
Father: Basically yeah…
Nathan: You must actually when, when the person bowl right, the other side right, actually you must, you must actually like be, must be, this is a, this is a courteous bowling, you have to let the person go first then you go…
Father: Okay, so you must bowl by the rules.
Nathan: Yeah.

Similar to the above discussion about bowling, Nathan’s father helped Nathan with the development of understanding both informal and formal based experiences in future
learning. In the following excerpt, Nathan told his father that he did not want to discuss about bowling but he preferred to discuss about written composition. Nathan thought that the composition topic would be related to “ambitions” and he wanted to know how he could address the topic. Nathan’s father modeled to Nathan the kinds of sub-issues which can be discussed such as “designer”, “engineer” knowing that Nathan had an inclination on these topics:

Nathan: I want to be a designer-engineer.
Nathan: my ambition is to design a flying car. I excel in sport in primary school, in the arts in secondary school, and I want to do engineering in the university!
Father: You can write about the everyday things – sports, Mona Lisa, iTouch – that there is both science and art integrated.

It is clear that informal context played an important role in Nathan’s learning as his father with his multiple roles as mentor, learning broker, consultant, and as a pointer to knowledge integration is instrumental in helping Nathan to regulate his learning across different contexts.

Conclusions

From the analysis, it is evident that students have the potential to control, monitor, and select goal-setting strategy in an informal context and with support from parental mentoring. As pointed out by Hung, Kim, Lim, and Jamaludin (in press), “with a packed curriculum to be covered in schools, students are often not able to engage in experimentations and related 21st century skills, but such opportunities are possible in informal contexts”. Furthermore, Biesta et al (2009) indicates that in everyday lives, young people learn from opportunities for action, participation, and reflection afforded by practices and communities. In this article, we have presented the opportunities that an informal context provided for students to experience regulatory processes and learning in a social world, which is outside of their school environment. Most students in the group interviews demonstrated the application of regulatory strategies to meet the demands and challenges in bowling. To enhance their awareness of their faulty throwing techniques,
students used note-taking as a way to assist them in making strategic adjustment for future performance. The transition from school to bowling did not involve only the physical setting but also a shift from standard closed-door examinations to competitions that are open to public. Under such a different learning context, students monitored and regulated their responses differently either by listening to music to reduce stress levels; taking one's time to spare without nervously rushing through; or approaching their coaches for helps. Students who engaged in these metacognitive and regulatory strategies can become increasingly capable of performing under different situations. The case of Dixon who approached his coaches for advice regularly indicates that a high achiever is more readily to seek helps from teachers (Puustinen, 1998; Wood & Wood, 1999). Further, the case example of Nathan reveals that the significance of mentoring is consistent with the views that “to understand fully the determinants and impact of educational setting, we need to consider their links to other aspects of an individual’s life context” (Moos, 1991). In the collected artifacts with students’ written statements of how their families supported their learning, Nathan wrote: “my father supports me by bringing me for bowling regularly and buying me balls. He also guided me and made me feel better during competition.” Similarly, these are other written statements by students, example two: “my parents support me. They bring me to bowl, they buy me new ball and they remind me to do the things that have been taught.” Example three: “my parents support me. Even if I do not do well, they will still encourage me and ask me to play my own game.” These examples document that social variable, parental mentoring, in an informal context can be an influential factor for students’ learning. Furthermore, when Nathan’s was facing difficulty in written composition, he asked his father for assistance and this help seeking adaptive behavior is an important self-regulatory strategy, which is crucial for student learning (Newman, 1994). Clearly, the understanding of ongoing social contexts in students’ learning experience highlighted the importance of mentor in demonstrating regulatory skills and supporting opportunities for learners to practice attitudes for metacognition and self-regulation on a daily basis.
References


