

Stimulating Self-Regulation for High and Low Achievers in a Self-Directed Learning Environment

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Abstract: The forthcoming trend of personalized learning drives the further development of individualization. Studies that relate to individual learning show possibilities for personalized learning in current education. This is because the goal of both individual and personalized learning are focused on how to help students pursue their learning and provide assistance to help students become lifelong learners. From the basis of cognitive theories, we believe that elementary students are able to be responsible for their own learning. However, most studies that related to individual learning were mainly from adult and adolescent education. In addition, as stated in Self-Determination Theory (Deci & Ryan, 1985), Deci & Ryan believed that self-regulation showed possible relation to student's motivation in learning. Hence, students' motivation plays an essential role in both individual learning and personalized learning. There needs to explore the factor that affects students' motivation. In order to help elementary students learn autonomously, there needs to explore the factors that affect student's motivation in learning. As a result, this study applied Self-Directed Learning (SDL) into math classrooms for exploring differences between high and low achievers in the motivation for learning. In this study, high achievers were more beneficial than the low achievers, where high achievers showed a significant difference with the low achievers on self-efficacy for learning & performance, metacognitive self-regulation, intrinsic goal orientation and resource management strategies: time and study environment.

Keywords: motivation, self-directed learning, self-regulation

1. Introduction

Hargreaves (2004) purposed nine gateways for personalized learning. The nine gateways stand for student voice, assessment for learning, learning to learn, new technologies, curriculum, advice & guidance, mentoring & coaching, workforce reform and design & organization. One of the nine gateways -- student voice was described as a key element for personalization in education. It defines student's perception in education and it also implies that education should be tailored into specific needs, which depend on student's personality, learning strategies, or problem solving skills. On the other hand, from the development of adaptive learning to personalized learning, student is able to actively choose their favorite learning materials and determine their own pace based on their learning portfolios, rather than passively receiving assignment from teachers. To this end, interest is crucial because it affects the choice that students would make, the pace that students would pursuit, and the strategy that student would adopt. As students grew up, studies pointed out that students' interest would become lower when they reached a higher grade in school, because the difficulty and complexity of formulated assessments increases with the growth of grades (Boggiano, Barrett, Weiher, McClelland, & Lusk, 1987; Covington & Omelich, 1985). Moreover, in order to stimulate student's interest in learning, there needed to explore essential elements that affected students' learning interest. Therefore, as stated in Self-Determination Theory, the intrinsic motivation and extrinsic motivation particularly related to the interest of students' learning (Deci & Ryan, 1985). It implied that both the intrinsic and extrinsic motivation played a certain role for student's interest in learning. Most students who lacked learning interests or motivation would show a deep depression or declines to learn, and some students even failed to understand the lectures in school.

As a result, in order to enhance student's motivation in learning, Tough (1979) and Knowles (1975) purposed Self-Directed Learning (SDL) for enhancing student's individuality in adult education. SDL provides a guidance that helps students prepare for their learning goals, reflect on their learning experiences, and learn with or without the assistance of classroom teachers. Also, SDL was believed as a possible solution to the personalization in learning, because students were being responsible for their learning decisions (Knowles, Holton & Swanson, 2011). In a SDL environment, students set their own goals, determine their own pace, negotiate proposals with the teacher, and revise the work that they learned (Gibbons, 2002). Gibbons showed elements that formulated the transformation of classroom learning which includes alternative choices for the design of SDL classrooms (such as guidelines for teachers, students and lesson plans). He also provided a framework for SDL in adolescent education, which students learned in a self-planned environment, and students learned under the guidance or assistance by the teacher in the SDL classroom. However, SDL was seldom discussed in elementary level in regular classrooms until recently a study by Tan, Shanti, Lynde, Cheah (2011) discussed the application at the elementary level. Tan et al. describes the experience on elementary student's characteristics, including the ownership, monitoring and management. Tan et al. believed that teacher's perception and assistance played an essential role in SDL, so they adopted the concept in adult education but they focused more on the elementary student's ownership, monitoring, teacher's professional training and assessment for SDL. We believed that students, especially in the elementary level, could be responsible for their learning. This is crucial for personalized learning because it would be able to help students become lifelong learners. Therefore, the ways that cultivating student's autonomous engagement should be taken into consideration.

Therefore, this study designs a framework that intends to explore the motivation for learning in regular classrooms and provide a preliminary analysis for the differences between high and low achievement students. In addition, this framework provides integrations among regular curriculum, goal settings, and monitoring. In this study, students will be able to strive for their own pace, which implied a personalized pace for individual students. In pursuing student's personalization, students determined their own pace based on their math learning capability, and they had to decide whether to accept additional challenges or other learning activities.

2. Literature Review

2.1 Motivation and Self-Regulation for Learning

Renninger & Hidi (2002) stated that interest includes affective and cognitive components, which are parts of individuals' engagement in learning activities. Also, motivation is considered as a means to the willingness of finishing certain learning activity (diSessa, 2000), and the self-regulation for personal management in the learning task. Self-regulation would be an essential element for the outcome of students' personalized learning. Studies explored the effects on the relation between self-regulation and the learning achievement, in which students were associated with the learning efficacy for learning autonomously in either in-class or after-class environment (Dweck, 1986; Wolters, Yu, & Pintrich, 1996). In the study by Cleary & Chen (2009), they believed that students with high self-regulation would deliver a greater strategies used than the low self-regulation students. Students with high self-regulation referred to higher goal settings, learning plans and strategies. With the high ability of goal setting, students were more able to pursuit the goal, which based on their own learning capabilities. The higher learning skills on plans and strategies, which implied the more appropriate choice on plans and strategies, the higher effective goals would be applied during the learning activity. In addition, different goals stand for different factors for motivation. It referred to the enjoyment on doing something that related to either intrinsic or extrinsic motivation in learning (Deci & Ryan, 1985; Ryan & Deci, 2000).

2.2 Self-Directed Learning (SDL) and Its Application

In SDL, students have to set their goals and negotiate the learning agreement or contract with the classroom teacher. Knowles (1975) defines SDL with 5 elements (diagnosing student's learning needs,

formulating student's learning goals, identifying human and non-human resources, selecting and applying learning strategies, and evaluating learning outcomes). These elements forms SDL as helping students for fulfilling the needs of learning goals, which consist of plans or contracts among instructors, students and peers. In Knowles' another work (Knowles, 1986), he suggested that the learning contracts should consist of:

- The acquisition for knowledge, skill, attitude, and value: this described the forthcoming acquisition by the students. In a math classroom of a public school, it referred to the domain knowledge such as conceptual understanding (math concepts, operations), procedural fluency (accuracy, effectiveness), strategic competence (problem solving) ... etc. (Kilpatrick, Swafford, & Findell, 2001)
- Learning resources and strategies: with the human or non-human resources being provided, the way that students used for accomplishing the goal should be addressed in a SDL environment.
- The date for accomplishing the goal: the target date played an important role for accomplishing certain tasks. An appropriate date affected the learning effectiveness and it might reflect student's status for knowledge acquisition.
- Evidence: after students learned with the aforementioned elements for learning contracts, they should present or demonstrate the process or materials that related to the accomplishment for the learning task.
- Assessment: advisors such as teachers, capable peers, or students themselves should validate the feasibility for the learning contract and they should check whether the learning contract was reasonable for the students to work on.

On the other hand, Brookfield (1985) and Moore (1973) also agreed that the autonomous of a learner should be provided with mechanisms for the learner to follow and to learn. Brookfield mentioned an empirical study that adult learners would mostly to be a field independent learner, which focused on the expert knowledge that associated with more inclined to self-directness. Nevertheless, as we believed that there would be field dependent and field independent adults; there could be learners that would not be able to learn autonomously, especially children. Consequently, there needs a mechanism to assure learner's autonomous learning process is effective and to make sure the external resources could be accessible. In a later work, Gibbons' (2002) perception of SDL is similar to Knowles but differ in terms of adolescent's motivation and self-assessment. He also defines SDL as a progressive pedagogy, which helps elementary school teachers overcome the difficulties for applying SDL in classrooms. The SDL elements he proposes consist of:

- Students should be able to control the experience for their learning;
- Students skill development;
- Students achieve the best performance by additional challenges;
- Student's self-management;
- Student's self-motivation and self-assessment.

Due to the various similarities, we adopt the SDL framework which encompasses the common beliefs underlying SDL and common elements across various prior researches. However, in school learning, choice would not be the one and only index that assess student's motivation (choice of tasks, effort, persistence, achievement) (Schunk, Pintrich, & Meece, 2008). Tan, Shanti, Lynde, Cheah (2011) addressed issues on teachers' experience, such as classroom management, teacher's professional training, assessment ... etc. More attention should be focused on teacher's professional developments.

3. Design

This study followed the design in Chen, Liao, Cheng, Yeh, & Chan (2012). Chen et al. let the students take math learning missions that were designed based on the formal curriculum in public schools. For each unit in the curriculum, the learning activities were packaged into math missions, which were placed in the learning platform. Moreover, in addition to the design by Chen et al., this study helps

students to take the missions from the learning platform, manage their own learning and determine the number of missions that based on their goal setting before the learning activities began. Students would strive for their own defined learning goals and learn through math learning missions with or without the assistance of talented companion or classroom teacher independently. In this study, this study develops a 3-element framework that consolidates the essence of self-directed learning. The 3-element framework includes interactive content, learning contracts for goal setting, and monitoring & reflection.

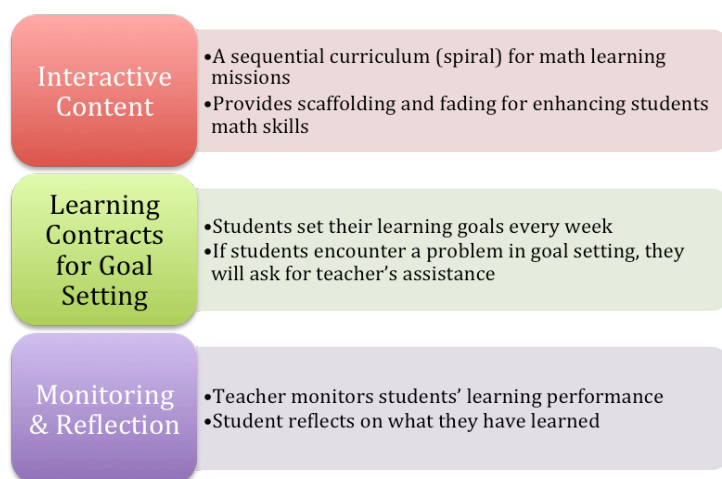


Fig 1. The 3-element framework for SDL.

3.1 Interactive content

The interactive content integrates the public school curriculum in an interactive way. From the spiral math curriculum in public schools, this study builds and enhances the current math learning knowledge into a more effective way. The design of this study follows and extends the K-W-L framework, which consisted of “What I Know”, “What I Want to Learn”, and “What I Learned” (Ogle, 1986). “What I Know” stands for the knowledge from the past experience, which might be learned in the last class, or common knowledge that happened beforehand. “What I Want to Learn” implies students’ desire for new knowledge. And “What I Learned” demonstrated what the students learned. Therefore, this study provides scaffolding and fading for students interact with the math knowledge with the use of their personal PCs. More specifically, this study would let the students to review, to learn, and to revise:

- Review: recalling the knowledge from last unit that might help understand the incoming math concept;
- Learn: understanding the math concept by scaffoldings and fading;
- Revise: practicing the knowledge that was learned, and trying to accept challenging questions from the similar math concept.

3.2 Learning Contracts

For the learning contracts in SDL, students have to set their learning goals in the first day of every week. Students would review the pace in the last 4 weeks (1 month), which was used as the reference for the goal setting this week. In order to help students review their previous effort in learning, the system would automatically count every student’s number of missions and performance, and it would suggest a suitable goal for the student’s to achieve. If students encounter a problem in goal setting, they will ask for teacher’s assistance. The teacher would be acknowledged in the teacher monitor. S/he would be able to help diagnose the student’s problem, provide appropriate suggestions, and come to a common agreement with the student.

3.3 Monitor & Assessment

In this study, both teachers and students were able to diagnose and reflect the learning performance through the learning platform. Due to the fact that system recorded every answer made by the students, teachers would easily monitor the learning progress for every student in their own classes, and they could actively or passively provide suitable assistance for the students who encountered a problem. Besides, students would also reflect what they had learned before the learning activities began. They could also decide whether accepting additional challenges such as complex problems, logical trainings (such as Sudoku), and small games for additional drill-and-practice exercises.

4. Results

The demand for understanding how student becomes self-regulated learners is appealing. Zimmerman (2008) showed that questionnaire and interviews were able to successfully predicting the student's learning outcomes. It reflects the internalization and personal regulations (Ryan & Deci, 2000). For exploring factors that help predict student's learning outcomes, factors that affecting the self-directness are being discussed. More specifically, such self-directness may be driven extrinsically by rewards, or grades, or intrinsically carried by the student's willingness, interest or engagement (Vrugt & Oort, 2008). Therefore, in order to explore the elements for personalized learning, we applied and modified Motivated Strategies for Learning Questionnaire (MSLQ) for exploring elementary student's internal motivation (Pintrich, 1991). This study follows the criteria in Motivated Strategies for Learning Questionnaire (MSLQ), where modified questionnaires were delivered to students before and after the system was applied, for the analysis of motivation for self-directed learning. The result of the questionnaire shows the orientation toward the learning activity, the level of participation, and the perception of active involvement (Pintrich, 1991). In this study, based on the pre-test for achievement and the criteria in MSLQ, students are divided into high/low achievement groups. High achievers reached an above-average score in the pre-test, and consequently low achievement students got a below-average score. Students with different learning capabilities show exceptional experimental results in different capability of achievements. High achievement students showed a significant difference with the low achievement students.

In this study, we delivered 58 questionnaires to the students, and 32 effective samples were returned and were used for the data analysis. As showed in Table 1, results in the first criteria showed that high achievement students had significant differences from low achievements in four different ways. Compared to low achievement students, high achievement students expected a higher performance for learning and task accomplishments (Criteria 1, $p < .05$). It addressed the issues that high achievement students were more likely to run for the success in learning tasks, and they were more eager to master the learning task than low achievement students (Cleary, 2006). The result is also consistent with the study by Stephenson, Poissant, & Dade (1999). Stephenson et al. pointed out that high achievers had higher cognitive abilities and achieved a greater efficiency than low achievers. As a result, it might due to the fact that most people strived for personal goal by the individual perception, which was based on their capabilities, and therefore a higher self-efficacy would result a higher learning achievement. As a result, high self-efficacy students set a higher goal than the low achievement students. High self-efficacy students had a higher commitment to learn (Bandura, 1991), and they had a higher awareness, knowledge and control of cognition than low achievers (Criteria 2, $p < .05$). It implied that high achievement students were more sensitive on the corresponding learning task, and they would demand for a higher level of knowledge acquisition. For this reason, Collins (1982) selected children with 3 levels of mathematic ability (high, mid, low). She compared these 3 levels of students to the students who had self-doubts on learning, and students were assigned to solve difficult problems. She found that students with high perceived self-efficacy would choose a more accurate solution than low perceived self-efficacy students. A similar work by Lei, Wang, & Tanjia (2002) showed that high achievers had a higher self-regulation. It was believed that students who owned more successful experiences in learning would enhance the intrinsic motivation, which might promote students' self-regulation ability (Boekaerts, Pintrich, & Zeidner, 2000). Therefore, the result also indicated that low self-efficacy students performed poorly because they lacked certain skills or the sense of self-efficacy as they lacked confidence to apply effective strategies for problem solving.

Table 1: Statistical comparison based on high/low achievement students.

Criteria		mean	s.d.	d.f.	t	sig.
1. Self-efficacy for learning & performance	High	4.421	.701	17.940	2.159	.045*
	Low	3.641	1.166			
2. Metacognitive self-regulation	High	4.005	.743	30	2.587	.015*
	Low	3.254	.895			
3. Intrinsic goal orientation	High	4.513	.524	30	4.307	.000***
	Low	3.346	1.003			
4. Resource management strategies: time and study environment	High	4.281	.739	16.143	2.135	.048*
	Low	3.333	1.478			

* $p < .05$, *** $p < .001$

In table 1, a significant difference for intrinsic goal orientation existed between high and low achievement students. This showed that the design of this study would help high achievement students achieved a higher intrinsic goal orientation than the low achievement students (Criteria 3, $p < .001$). It also implied that high achievement students were more engaged in the learning task, and s/he considered the participation in the learning task as a challenge, curiosity or mastery (Pintrich, 1991). The significance difference for high achievement students addressed the issue that most students desired for a higher learning goal, and they were more focused on the goal accomplishments. Moreover, in the study by Bandura & Schunk (1981), they described that the intrinsic goal orientation was positively related to the strength of self-efficacy in arithmetic activities. As a result, the higher self-efficacy, the higher intrinsic goal orientation was showed in the learning task.

Besides, for resource management strategies in table 1, it described the student's perception on the goal pursuance, the time management and regulation. In the classroom of a public school, most teachers dominated the classroom learning, in which they determined what was learned, and students would learn under supports or guidance by teachers (Deci, Schwartz, Sheinman, & Ryan, 1981). After class, students learned under the assistance or control by parents, where most parents concerned about the assessment, lecture revision, or encouragement in learning. Ryan & Deci (2000) pointed out that the parent's intervention provided stronger effects on engagement and performance for low achievement students, and low achievement students were more benefited from the parent's use of control than high achievement students.

Concerning the effect by the control of parents, a study by Pomerantz (2001) showed that high achievement students might own a higher personal value than low achievement students, and the control by parents might emphasize on the depression for high achievement students' competence and the application of help-seeking strategies (Corno, 1986; Ryan & Pintrich, 1998; Zimmerman & Martinez-Pons, 1988). Therefore, the aforementioned studies showed more positive results on low achievement students (parent's use of control) and negative results on high achievement students (depression). However, in this study, a significant difference was found in the resource management strategies between high achievement and low achievement students. As showed in table 1, the result indicated that high achievement students had a better planning, monitoring and regulation than low achievement students (Criteria 4, $p < .05$). The reason to this phenomenon might due to high expectations from parents, teachers or peers (Seginer, 1983; Weinstein, 2002), or the use of control and autonomy support by parents (Black & Deci, 2000; Guay, Boggiano, & Vallerand, 2001).

5. Discussion

The goal of this study is to reveal and discuss the possible factors that affect student's personalized learning. Although this study provides an analysis for the high and low achievers, we believed that analyses for the learning outcomes, the effects for different levels of intrinsic or extrinsic motivation, and individual's perception for the learning activities. More discussions should be addressed in further studies. However, in order to explore the elementary student's motivation factors for personalized learning. This study provides a preliminary analysis for student's personalized learning. By applying

SDL in regular classrooms, a Motivated Strategies Learning Questionnaire (MSLQ) was used to analyze the factors that affect student's learning motivation. Result indicates that high achievers were more beneficial than the low achievers, where high achievers showed significant differences in self-efficacy for learning & performance, metacognitive self-regulation, intrinsic goal orientation and resource management strategies: time and study environment with low achievers. High achievers showed a higher self-regulation that led to effective decisions for learning goals, which related to the mastery of knowledge, skills or values. Compared to the high achievers, the reason to the phenomenon for low achievers may due to the low motivation or interest, low context awareness, low confidence or non-effective goal settings.

Acknowledgements

The authors would like to thank the National Science Council of the Republic of China, Taiwan, for the financial support (NSC-101-2631-S-011-002, NSC-101-2511-S-008-016-MY3, NSC-100-2511-S-008-013-MY3, NSC-99-2511-S-008-002-MY3, NSC-101-2811-S-008-009, NSC-101-2811-S-008-010), and Research Center for Science and Technology for Learning, National Central University, Taiwan.

References

- Bandura, A., & Schunk, D. H. (1981). Cultivating competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of personality and social psychology*, 41(3), 586.
- Black, A. E., & Deci, E. L. (2000). The effects of instructors' autonomy support and students' autonomous motivation on learning organic chemistry: A self-determination theory perspective. *Science education*, 84(6), 740-756.
- Boekaerts, M., Pintrich, P. R., & Zeidner, M. (Eds.). (2005). *Handbook of self regulation*. Access Online via Elsevier.
- Boggiano, A. K., Barrett, M., Weiher, A. W., McClelland, G. H., & Lusk, C. M. (1987). Use of the maximal-operant principle to motivate children's intrinsic interest. *Journal of Personality and Social Psychology*, 53(5), 866.
- Brookfield, S.D. (Ed.) (1985). *Self-directed learning: from theory to practice*. San Francisco, CA: Jossey-Bass.
- Chen, Z. H., Liao, C. C. Y., Cheng, H. N. H., Yeh, C. Y. C., & Chan, T. W. (2012). Influence of game quests on pupils' enjoyment and goal-pursuing in math learning. *Educational Technology & Society*, 15(2), 317-327.
- Cleary, T. J. (2006). The development and validation of the self-regulation strategy inventory—self-report. *Journal of School Psychology*, 44(4), 307-322.
- Cleary, T. J., & Chen, P. P. (2009). Self-regulation, motivation, and math achievement in middle school: Variations across grade level and math context. *Journal of School Psychology*, 47(5), 291-314.
- Corno, L. (1986). The metacognitive control components of self-regulated learning. *Contemporary Educational Psychology*, 11(4), 333-346.
- Covington, M. V., & Omelich, C. L. (1985). Ability and effort valuation among failure-avoiding and failure-accepting students. *Journal of Educational Psychology*, 77(4), 446.
- Deci, E. L. & Ryan, R. M. (1985). *Intrinsic Motivation and Self-Determination in Human Behavior*. New York: Plenum Press Publishing Co.
- Deci, E. L., Schwartz, A. J., Sheinman, L., & Ryan, R. M. (1981). An instrument to assess adults' orientations toward control versus autonomy with children: Reflections on intrinsic motivation and perceived competence. *Journal of Educational Psychology*, 73(5), 642-650.
- diSessa, A. A. (2000). *Changing Minds*. MIT Press, Cambridge, MA.
- Dweck, C. S. (1986). Motivational processes affecting learning. *American psychologist*, 41(10), 1040.
- Gibbons, M. (2003). *The self-directed learning handbook: Challenging adolescent students to excel*. Wiley.com.
- Guay, F., Boggiano, A. K., & Vallerand, R. J. (2001). Autonomy support, intrinsic motivation, and perceived competence: Conceptual and empirical linkages. *Personality and Social Psychology Bulletin*, 27(6), 643-650.
- Hargreaves, D. (2004). *Personalising Learning: Next Steps in Working Laterally*, www.schoolsnetwork.org.uk/uploads/documents/4402.pdf
- Hargreaves, D. (Ed.) (2005). *About learning: report of the Learning Working Group* (London, Demos).
- Kilpatrick, J., Swafford, J., & Findell, B. (Eds.). (2001). *Adding+ it up: Helping children learn mathematics*. National Academies Press.

- Knowles, M. S. (1975). *Self-directed learning: A guide for learners and teachers*. Englewood Cliffs: Prentice Hall/Cambridge.
- Knowles, M. S., Holton III, E. F., & Swanson, R. A. (2012). *The adult learner*. Routledge.
- Lei, L., Wang, L., & Tanjia, C. (2002). Comparative study of self-regulated learning between high achievers and low achievers. *Psychological Development and Education*, 2, 6-11.
- Moore, M. G. (1973). Towards a Theory of Independent Learning. *Journal of Higher Education*, 44(12), 661-679.
- Ogle, D. M. (1986). KWL: A teaching model that develops active reading of expository text. *The Reading Teacher*, 39(6), 564-570.
- Pintrich, P. R. (1991). A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ).
- Pomerantz, E. M. (2001). Parent× child socialization: Implications for the development of depressive symptoms. *Journal of Family Psychology*, 15(3), 510.
- Renninger, K., & Hidi, S. (2002). *Student interest and achievement: Developmental issues raised by a case study*.
- Ryan, R. M. & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55, 68-78.
- Ryan, A. M. & Pintrich, P. R. (1998). Achievement and social motivational influences on help seeking in the classroom. In S. A. Karabenick (Ed.), *Strategic help seeking: Implications for learning and teaching* (pp. 117–139). Mahwah, NJ: Erlbaum.
- Schunk, D. H., Pintrich, P. R., & Meece, J. L. (2008). *Motivation in education: Theory, research, and applications*. Englewood Cliffs: Merrill/Prentice Hall.
- Seginer, R. (1983). Parents' educational expectations and children's academic achievements: A literature review. *Merrill-Palmer Quarterly*, 29, 1–23.
- Stephenson, R., Poissant, H., & Dade, M. O. (1999). *Third graders' Self-regulation and self efficacy in a concept formation task: differences between low and high achievers*. ERIC Clearinghouse.
- Tough, A. (1979). *The adult's learning projects: A fresh approach to theory and practice in adult learning*. Toronto: Ontario Institute for Studies in Education.
- Vrugt, A., & Oort, F. J. (2008). Metacognition, achievement goals, study strategies and academic achievement: pathways to achievement. *Metacognition and Learning*, 3(2), 123-146.
- Weinstein, R. S. (2002). *Reaching higher: The power of expectations in schooling*. Cambridge, MA: Harvard university Press.
- Wolters, C. A., Yu, S. L., & Pintrich, P. R. (1996). The relation between goal orientation and students' motivational beliefs and self-regulated learning. *Learning and Individual Differences*, 8, 211–238. doi:10.1016/S1041-6080(96)90015-1.
- Zimmerman, B.J. & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology*, 80, 284-290.