By Daniel Jarvis, PhD (ABD)
May 2005

The Benefits of Risk-Taking and Mistake-Making:

REFLECTIONS OF A FATHER AND DAUGHTER ON THE LEARNING PROCESS

Daniel H. Jarvis, PhD (ABD)
PhD Candidate/ Graduate Teaching Assistant
J. G. Althouse Faculty of Education
The University of Western Ontario
London, Ontario, Canada
(519) 471 8579
dhjarvis@sympatico.ca

N.B. This article is a follow-up report, or case in point, regarding an article which was previously published in Child & Family:

Onslow, B., Edmunds, G., Adams, L., Waters, J., & Chapple, N. (2002). Children and their parents: Learning math together and having fun. Child & Family, *6(1), 6-14.*

Introduction

As a mathematics educator who was very interested in the Esso Family Math Program[1], I had asked the organizers about the possibility of participating in one of the local groups with my 4-year-old daughter. We were welcomed and encouraged to attend, and I was also asked if I would consider keeping a brief observational and reflective journal throughout the six sessions, as a form of ongoing research. Being regularly involved in research, I had no qualms about this request and looked forward to recording impressions of the program as Clara and I experienced it together. What I did not expect was my own emotional response, as a parent, to the vignette, which I will describe shortly. My feelings that night, and throughout the program as I had more time to think about this and other incidents, have helped me to reconsider the nature and importance of risk-taking and mistake-making, and how these two activities relate to the teaching and learning of mathematics.

Parents, Children, and Cognitive Dissonance: Some Background Research

Research conducted throughout the past few decades has shown that parental involvement in children's schooling is one of the most significant factors regarding academic success (Colgan, 2002, p. 12; Expert Panel on Early Math in Ontario, 2003, pp. 17-18; Onslow, Edmunds et al., 2002a, pp. 28-29). While many of these studies have focused primarily on the mother's influence, a recent study by Flouri and Buchanan (2004, p. 150) found that the father's, or father figure's,

1 The Esso Family Math Project is a "community-based program for families who would like their children to experience success in math, yet who may find it difficult to obtain help in facilitating their children's mathematical development." The author would like to thank Dr. Barry Onslow, the FM Project Director, for his valued input on this paper; and the many members of the FM team for their encouragement regarding our FM experience. For more information and excellent resources, visit their website at: http://www.edu.uwo.ca/essofamilymath/

involvement also has a significant long-term effect in a child's school achievement. While it is therefore important for both mothers and fathers (i.e., female/male caregivers) to take active roles in their children's learning, certain formidable obstacles exist in this undertaking. In many parents' minds, mathematics is still predominantly thought of as the memorization of number facts and related computational skills (Leedy, LaLonde, & Runk, 2003, p. 291). Moreover, many parents are unfamiliar, and therefore rather uncomfortable with the content of today's standards-based, K-8 mathematics curriculum (e.g., new topics such as probability and statistics). Even when parents earnestly want to assist their children with homework assignments, many are unsure how to do so (Onslow, Edmunds, Adams, Waters, & Chapple, 2002, p. 6; Whiteford, 1998, pp. 65-66); and, they may be rather uneasy with the multiple teaching and learning strategies that are now used in many mathematics classrooms (Bay-Williams & Meyer, 2003, pp. 54-55; Expert Panel on Student Success in Ontario, 2004, p. 80). For example, they may not easily relate to elements of cooperative group work, increased communication and problem solving, the use of manipulatives and technology, and varied assessment, since their own mathematics education likely did not include any or many of these components.

In attempts to assist parents, teachers have successfully implemented various ideas and programs such as regular math problems featured in school newsletters; colourful information booklets regarding mathematics; web-based calendars and resources; take-home math practice bags; math music CDs and videos; games and puzzles; math walks or field trips; children's books that have mathematical connections; inviting parents to attend class as observers or assistants; and, parent/family math nights and programs (Colgan, 2002, p. 15; Kloosterman, 1998, p. 207; Onslow, Edmunds et al., 2002b, pp. 6-10; Peressini, 1998, p. 378). These new initiatives and innovative resources have been shown to assist parents in becoming more involved in their children's learning. But perhaps even more crucial for this home-school connection to be successful is that both the teacher and parents understand that children must be allowed to regularly struggle with math problems in order to develop as learners.

The National Council of Teachers of Mathematics clearly emphasized in their *Principles and Standards* document that "effective mathematics teaching requires understanding what students know and need to learn and then *challenging* and supporting them to learn it well" (2000, p. 16, emphasis added). Students of mathematics must be adequately challenged in day-to-day learning activities. It is only in this way that children will be able to grapple with, what Piaget referred to as, "disequilibrium" or "cognitive dissonance," and in so doing, reinforce existing neural connections while developing new connections and deeper mathematical understanding. Martinez and Martinez (2003, pp. 29-30) likewise discuss the recognition, and powerful potential, of "eustress" (good stress)—as opposed to "distress"—in helping children learn mathematics. Chatterley and Peck (1995) describe how even the most well-intentioned teacher can rob students of mathematical learning: "If we understand the process necessary to provide the referents within the minds of our students, we will cease to mentally cripple them by being overly kind and sympathetic and by helping too much and often far too soon" (p. 436). As Leedy, LaLonde, and Runk (2003) point out, learning difficult things can be a "messy and emotional affair":

> [T]eachers need to overcome their expectations of order. Second, the students have to become comfortable with ambiguity. They need to be comfortable asking "why?" while still acquiring the basic skills. Uncertainty is anxiety producing, so we are asking a lot of our children. Teachers must help students... manage the anxiety created by struggling with understanding the concepts. Rewarding the child's efforts in discovering the concepts must take precedence over rewarding the correct answer. (p. 290)

The same is true for parents when working with their children. In mathematics, as with many other aspects of cognitive and social development, children must be supported in their risk-taking and mistake making.

Notwithstanding the need for adequate challenge, parents must also take pains to not overly swamp children with learning tasks that are too far above, or ahead of them (Turner & Meyer, 2004, p. 312). Tomlinson (2001) notes that "when a student continues to work on understandings and skills already mastered, little if any new learning takes place. On the other hand, if tasks are far ahead of a student's current point of mastery, frustration results and learning does not" (p. 8). Both extremes are obviously to be avoided—the secret, therefore, lies in finding the right combination of *applied mystery* and *mastery*. One effective method for parents to use to support children's learning is that of *scaffolding* (Consortium of Ontario School Boards, 2003, p. 38). Scaffolding may involve carefully prepared steps that provide a framework for new learning; helping children to organize their solutions; or simply positive, consistent verbal coaching that reinforces the bond between child and parent. The Russian psychologist, Lev Vygotsky (1930/1978), developed an insightful educational theory which he referred to as the Zone of Proximal Development (ZDP)—the difference between the learner's capacity to solve problems on his/her own, and his/her capacity to solve them with external assistance. According to this theory, the parent's role is to provide appropriate instructional scaffolding and relational support in order to maximize a child's achievement within his/her ZDP. Adequate and appropriate scaffolding allows the parent to extend and maximize the degree of challenge for their children, while still encouraging them to take risks and to learn new concepts through their initial and important failures. The following real-life vignette provides one example regarding these particular challenges.

Vignette: Up, Down, Sideways

As Clara and I walked into the public library, there was a sense of excitement and anticipation as we looked around the room of new faces. We found two empty chairs at one of the side tables and introduced ourselves to the other children and adults already seated next to us. We both noticed the many interesting books, posters, and manipulatives to be found around the space, and therefore became curious to know just what kind of experiences were in store for us. After about ten minutes, the leader invited us to come up and take some pizza, drinks, and dessert. Following dinner, everyone was formally welcomed and then the leader began the program with various planned activities. At one point during the evening, the children were all asked to come forward and sit on the carpet in front of the leader, so as to share their understandings of patterning.

Leader: *All right now, boys and girls, let's have a look at these bears and see if we can't find a pattern. Notice that the first bear is standing straight with his head up and feet down. But look, the second bear is upside down with his head at the bottom and feet at the top. And who can describe the third bear?*
Kulchurika: *It's laying down, sort of—sideways, like.*
Leader: *Okay, right. So, let's say it together while I point to each of the eight bears—Up, down, sideways, up, down, sideways, up, down—who thinks they know what bear would come next if this pattern continues? Yes, Clara?*
Clara: (hand held high, with much enthusiasm) *Up?!*
Leader: *Well, that's a good suggestion, Clara. Let's look at the pattern again to check your answer. Say it with me—up, down, sideways, up, down, sideways, up, down, up—does that seem right, do you think?* (Brief pause—Clara shakes her head, knowing there's a problem. She does not offer a correction, but looks back at me with confused, anxious, and saddened eyes.) *Does anyone else have another idea?*
Aize: *I think it's supposed to be sideways*. (They recite it together, as a group, trying this new idea.)
Leader: *Well, what does everyone think?* (general affirmation) *Yes, I think we've discovered the pattern!*

Discussion: Conceptual and Perceptual Difficulties

Clara was not unlike other students of the same age in terms of conceptual difficulties experienced throughout the Family Math program. Referring back to my journal notes, I see that she not only struggled with the bear orientations (i.e., patterning), but also with the conservation

of length (e.g., the misinterpretation of "spread-out" counters being of *greater number* than "closely-aligned" ones) and capacity (e.g., the possibility of shorter, but wider, containers holding more water than taller ones); and, a general difficulty in estimating objects exceeding the number 10. All of these difficulties were overcome through time and with practice, and, for the record, I should note that Clara has enjoyed and excelled in mathematics in formalized schooling. What's important here, though, is not her eventual understanding of concepts, but the actual fact that she was allowed and encouraged to *struggle* with challenging mathematics in a caring environment, such as that provided by the Family Math leader that evening.

Let's return again to the bear-patterning incident described in the vignette. Given that it is a relatively rare occurrence for an adult to be observing his/her own child volunteer an answer during a public forum, perhaps I should not be all that concerned about my reaction. However, I wonder if it is not somehow connected to a significant commentary on parental involvement in general? At that particular moment—when Clara offered an incorrect response and then looked back at me—although I felt very confident with the curriculum and reform-oriented strategies, and supported by leaders and volunteers that night, it was my reaction to her first public academic *failure*, as a parent, that really quite surprised me. My initial and automatic response was to feel somewhat embarrassed—to look on the error with disappointment and perhaps judgment, rather than view it as an *opportunity for growth and new learning*. As a mathematics instructor, I had not responded in this way with hundreds of students over the years, when they had volunteered incorrect answers in my classrooms. And yet, with my own child, my *affective*, or emotional, response seemed to have overcome my well-reasoned and academically seasoned *reflective* one. While I did not mention any of this initial reaction to Clara, and even though we worked on patterning together (at her request) throughout the coming week until it was well understood, this personal revelation bothered and intrigued me. I had been confronted with a form of parental pride, which, while often being a strong and healthy emotion, in this instance was found to conflict with clear thinking about thinking—a strange case of *virtuous vice*.

Most importantly, perhaps, I must now ask myself the following significant question: Would I have allowed Clara to struggle with the mathematics and to wrestle with her own cognitive dissonance if the two of us had been working on her mathematics homework together? Quite often, it is this sort of cognitive tension, so very necessary for learning, which can be, and often is, avoided by parents in the home, and sometimes even by teachers in the classroom.

Conclusion: Understanding Patterns in Math and Mind

In retrospect, Clara most likely wanted to please her father, gain affirmation from the Family Math leader, and be accepted by the other children that evening—one could argue that these are quite natural feelings. But more than this, I wonder if she just really wanted to understand the mathematics—to solve the puzzle before her. Perhaps it was this curiosity that originally drove her hand up, or later, drove her to practice until she more fully understood this new piece of mathematics learning.

What if the leader had disregarded her answer completely or worse yet, commented on its lack of correctness in jest? What if the parent she glanced back at had not forced a smile and been quite so successful in masking his inner disappointment? What if the very first time she dared to take a public risk in a mathematics-learning environment, she met with blatant disapproval or even ridicule? Would she ever have tried again? On the other hand, if Clara is daily encouraged to take risks in solving problems, she is far more likely to take further risks, to communicate her ideas to others, to develop deeper understandings of key concepts, and to simply enjoy the wonders of mathematics.[2]

Dad has since learned to welcome risk-taking during

2 For detailed lists of practical suggestions for parents wanting to help their children learn mathematics, please refer to: Helping Your Child Learn Math: A Parent's Guide (Ontario Ministry of Education, 2003) available at http://www.edu.gov.on.ca/eng/document/brochure/earlymath/index.html ; and to Leading Math Success: Notable Strategies > Family and Community Presentations (Expert Panel on Students Success in Ontario, 2004) available at http://www.curriculum.org/occ/strategies/index.shtml

shared mathematics times and to anticipate Clara's, and his own, initial errors with more of an attitude of enthusiasm. He's tried his best to convey this to his daughter by listening more carefully, asking good questions, and appreciating all of Clara's answers, since her incorrect ones often convey more information about her actual mathematical understanding than do her correct ones. More than anything, perhaps, he's learned that one can always be proud of a brave attempt and a willingness to learn from one's mistakes. Parents must take on the responsibility of transforming these opportunities of risk-taking and mistake making into successful learning experiences for their children.

References

Bay-Williams, J. M., & Meyer, M. R. (2003). Help! Parents and standards-based mathematics. *Principal Leadership, 3*(7), 54-60.

Chatterley, L., & Peck, D. (1995). We're crippling our kids with kindness!! *Journal of Mathematical Behavior, 14*(4), 429-436.

Colgan, L. (2002). Mathematics at home. *Ontario Mathematics Gazette, 41*(1), 12-15.

Consortium of Ontario School Boards. (2003). *Targeted implementation and planning supports: Grades 7, 8, and 9 Applied mathematics*. Toronto, ON: Queen's Printer for Ontario. Retrieved May 12, 2005, from http://www.curriculum.org/occ/tips/index.shtml

Expert Panel on Early Math in Ontario. (2003). *Early math strategy: The report of the expert panel on early math in Ontario*. Toronto, ON: Ontario Ministry of Education. Retrieved May 12, 2005, from http://www.edu.gov.on.ca/eng/document/reports/math/index.html

Expert Panel on Student Success in Ontario. (2004). *Leading math success: Mathematical literacy, Grades 7-12: The report of the expert panel on student success in Ontario*. Toronto, ON: Ontario Ministry of Education. Retrieved May 12, 2005, from http://www.edu.gov.on.ca/eng/document/reports/numeracy/index.html

Expert Panel on Students Success in Ontario. (2004). *Leading math success: Notable strategies - Closing the gap*. Toronto, ON: Ontario Ministry of Education. Retrieved March 4, 2005, from http://www.curriculum.org/occ/strategies/index.shtml

Flouri, E., & Buchanan, A. (2004). Early father's and mother's involvement and child's later educational outcomes. *British Journal of Educational Psychology, 74*, 141-153.

Kloosterman, P. (1998). Parent involvement in elementary problem solving. *School Science and Mathematics, 98*(4), 205-210.

Leedy, M. G., LaLonde, D., & Runk, K. (2003). Gender equity in mathematics: Beliefs of students, parents, and teachers. *School Science and Mathematics, 103*(6), 285-292.

Martinez, J. G. R., & Martinez, N. C. (2003). Raising middle school math standards without raising anxiety. *Middle School Journal, 34*(4), 27-35.

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics*. Reston, VA: Author.

Onslow, B., Edmunds, G., Adams, L., Waters, J., & Chapple, N. (2002). Children and their parents: Learning math together and having fun. *Child & Family, 6*(1), 6-14.

Onslow, B., Edmunds, G., Chapple, N., Forsythe, J., Burakari-Adera, R., & Waters, J. (2002a). Parents: The logical link for supporting children's mathematical understanding (Part 1). *Ontario Mathematics Gazette, 40*(4), 27-31.

Onslow, B., Edmunds, G., Chapple, N., Forsythe, J., Burakari-Adera, R., & Waters, J. (2002b). Parents: The logical link for supporting children's mathematical understanding (Part 2). *Ontario Mathematics Gazette, 41*(1), 6-10.

Ontario Ministry of Education. (2003). *Helping your child learn math: A parent's guide -*

The Ontario early math strategy. Toronto, ON: Author. Retrieved May 12, 2005, from http://www.edu.gov.on.ca/eng/document/brochure/earlymath/index.html

Peressini, D. D. (1998). The portrayal of parents in the school mathematics reform literature: Locating the context for parental involvement. *Journal for Research in Mathematics Education, 29*(5), 555-582.

Tomlinson, C. A. (2001). *How to differentiate instruction in mixed-ability classrooms* (2nd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

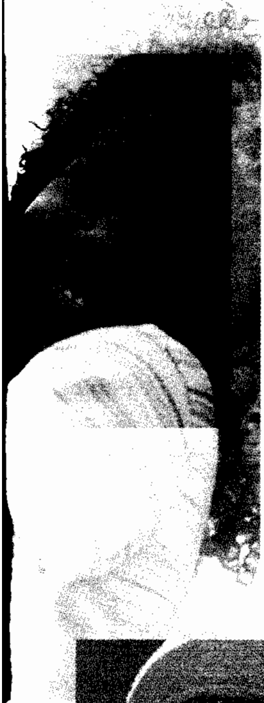
Turner, J. C., & Meyer, D. K. (2004). A classroom perspective on the principle of moderate challenge in mathematics. *The Journal of Educational Research, 97*(6), 311-318.

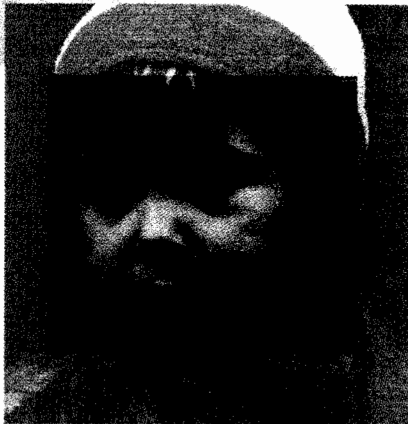
Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press. (Original work published 1930)

Whiteford, T. (1998). Math for moms and dads. *Educational Leadership, 55*(8), 64-66.

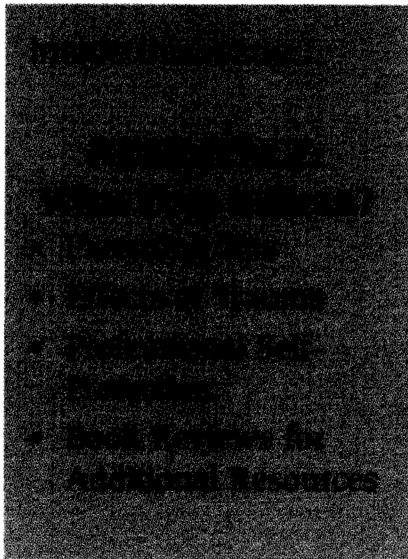
In mathematics, as with many other aspects of cognitive and social development, children must be supported in their risk-taking and mistake making.

Volume 8, No. 2
ISSN #1206-3177





child & family JOURNAL



In This Issue

Editorial Mission / Subscription Information	**1**
In This Issue	**2**
Editorial	**3**
Children, Trauma and the Question of Resilience Kathy Lawrence	**4**
Resilience Versus Coping Raymond Lemay	**11**
It Can Happen to You! Patricia Vanderheyden	**16**
Raising Resilient Children Dick O'Brien	**20**
The Benefits of Risk-Taking and Mistake-Making Daniel Jarvis	**22**
Interpersonal Psychotherapy for Depressed Adolescents Book Review by Kent Hollingsworth	**28**
Protecting Children From Domestic Violence Book Review by Patricia Vanderheyden	**30**
Young Children and Trauma Book Review by Alison Johnston	**32**
Straight Talk About Psychological Testing for Kids Book Review by Joelle Martin-Root	**33**
Instructions to Authors	**35**
Coming Events	**37**

By Paula Brunkard

As some of you may have noticed with the last issue, I am the new managing editor of the Child and Family Journal. Michelle Penta did a fabulous job of establishing this journal and I wish her great success in her next professional venture. Thank you Michelle for your support during the transition phase.

The last issue of the Child and Family Journal was dedicated to the prevention of teen suicide. This topic brought back questions regarding resiliency and handling stress. What allows some people to "bounce back" from extreme stress like trauma while others struggle just to deal with the challenges of daily life?

Day to day stress is one thing but getting over extreme stress such as trauma is much more challenging. Two articles look at the issues of resiliency with respect to trauma. Lemay takes a close look at compartmentalizing stress. Lawrence researches the effect of trauma on children and youth, and how this relates to later mental health problems.

A colleague recently said, "Multi-tasking is esteeming" in our society. What a frightening message for our children who feel their world is already moving too fast and demanding too much. Professionals too fall into the over-stressed category. The article by Vanderheyden addresses the issue of vicarious trauma and challenges professionals to identify their own physical stress levels and to balance those with personal care.

According to the Suicide Information and Education Centre in Calgary, Alberta, suicide prevention begins when children are very young, teaching them, *"how to respond to adversity and stress in a manner which will lead to solutions that do not put their life at risk."* It goes on to suggest that parent/child relationships are a key factor in helping children value themselves. (SIEC Alert #40 at website www.suicideinfo.ca)

Therefore, this issue includes some parenting tips for raising resilient children by O'Brien. A sweet personal scenario by Jarvis demonstrates the parental angst in allowing children to take risks and make mistakes when learning something new. (Jarvis wrote as a follow-up to a previous family math article, vol. 6 #1, but the concept also tied in to the resiliency training proposed by O'Brien.).

Don't forget to check out the great book reviews!