

## MATHEMATICAL AND FINANCIAL LITERACY WITH FAMILIES

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*There is a strong link between citizens’ quantitative literacy abilities and their financial prosperity. This study applied a social justice perspective to describe families’ personal flourishing within the context of numerical, mathematical, and financial literacy (NMFL) education. Four families participated in a weekly community program with mathematical and financial literacy goals. The data showed that participants gained confidence and skills and felt empowered to teach/transfer that knowledge to their children. The author proposes a conceptual framework linking personal flourishing with NMFLs, and suggests the framework be used to investigate and describe quantitative and financial literacy in future empowering pedagogies research.*

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Numerical, mathematical and financial literacies (NMFLs) are pressing economic, social, and cultural challenges. There is a strong link between citizens’ basic numerical or mathematical abilities and their financial prosperity and civic engagement (Human Resources and Skills Development Canada, 2012). It is becoming evident that NMFLs are increasingly necessary for fully contributing citizens of tomorrow (Steen, 2001). This study applied a qualitative research approach to describe personal flourishing (Grant, 2012) which includes participants making meaning and sense of important aspects in their lives, having a sense of agency, and participating in activities of financial literacy. Personal flourishing was investigated within the context of numerical, mathematical, and financial literacy (NMFL) education.

Four families participated in a weekly evening program (eight consecutive weeks). The Count On Yourself (COY) project was designed to inform participants about NMFLs. Count On Yourself provided a parallel program for adult and child NMFL literacy: while parents were involved in a financial literacy course, their children participated in a *Math Camp* led by teacher candidates from a local university. The goal of the project was for both adult and child participants to become more mathematically empowered. Analysis of the individual and focus group interview data showed that adult participants described a sense of personal flourishing, gained confidence and skills, and felt financially empowered enough to teach/transfer that knowledge to their children. This initiative integrated research and practice and addressed the practical needs of a community.

Based on a research study that sought to analyze how participants would express their ideas of financial literacy and express their personal flourishing, I propose a conceptual framework designed to study programs that promote Numerical, Mathematical and Financial Literacies (NMFLs) and to describe the participants’ voices. A robust social justice research vision (Grant, 2012) was applied to offer numerical, mathematical and financial literacies in a community. The research asked: 1) How did the adult participants describe their learning about financial literacy? and 2) How did this impact them and their families, and what, if any action did they take?

### **On Numerical, Mathematical and Financial Literacies (NMFLs)**

Innumeracy, or “an inability to deal comfortably with the fundamental notions of number and chance, plagues far too many otherwise knowledgeable citizens” (Paulos, 2001, pp. 3-4). Numeracy was determined by Smith, McArdle, and Willis (2010) to be “by far the most predictive of wealth among all cognitive variables” (p. 18). Behrman, Mitchell, Soo, and Bravo (2010) worked to isolate the causal effect of financial literacy on wealth accumulation, and found that the largest effect was

financial literacy. In these studies, numeracy and financial literacy were both found to be predictors of wealth.

This study is set in a Canadian community, and though North American data was sought and utilized, the issues surrounding Numerical, Mathematical and Financial Literacies are not unique to the North American context. As defined by the Human Resources and Skills Development Branch (2012), quantitative literacy or numeracy is “the knowledge and skills required to effectively manage the mathematical demands of diverse situations”. The 2003 study found that over half of respondents (55 %) scored only Level 1 or 2 [of 5 levels] on the numeracy proficiency scale. These low results are significant because numeracy and problem solving are linked to financial prosperity and civic engagement (Behrman et al., 2010; Human Resources and Skills Development Canada, 2012; Smith et al., 2010). Similarly, a Canadian report (Statistics Canada, 2008) found that 49 percent of all adults say they do not engage in household budgeting.

There is also substantial evidence that financial literacy programs “can make an important contribution to the well-being of vulnerable groups” (McFayden, 2012, p. 1). Gutstein (2006) wrote that “[r]eading the mathematical word is equivalent to developing mathematical power” (p. 29) and included that “opportunity to learn, access, and equity all demand that marginalized students get the chance to develop” the tools for mathematical empowerment (p. 30). This study engaged grassroots community resources to support NMFLs, and applied a qualitative research approach for the purpose of improving awareness, access, and quality of programs available to the participating school community.

### **School Community**

The elementary school involved in the Count On Yourself project is located in a smaller urban community adjacent to a larger city. The community elementary school involved had been identified as a low-literacy school. The school Principal was an administrator in the larger community for more than 20 years. The school historically had poor academic performance, and data indicated that students had poor achievement in intermediate grades and were less likely to graduate than their peers (British Columbia Ministry of Education, 2006). The school Principal was highly trusted and a consistent and dedicated member of the community, and I had been a district consultant. Given these predetermined trusting relationships, the Parent Council for the school was quick to approve the program and the research.

The project was announced at a community forum, and four families chose to participate in the Count On Yourself quantitative and financial literacy program. Though all members of the school community were invited to participate, it was fortunate that a fairly small group signed up for the first iteration of this program. A trusting environment could be built with a smaller group. The four families who participated were (aliases assigned) Valerie and Brent, parents of two children in 4<sup>th</sup> and 5<sup>th</sup> grade. Ema and Phil, parents of one 2<sup>nd</sup> grade child and three not yet in school, Anna (whose husband did not participate) with children in 1<sup>st</sup> and 6<sup>th</sup> grade, and Carolyn, whose husband and children did not participate.

### **Theoretical Framework**

#### **Reading and Writing the World**

Freire wrote about the fallacy of teaching the technical skills of reading as disconnected from social and political contexts. Mathematics is also typically taught as apolitical, and contexts are often imposed rather than the mathematics naturally emerging from situational problems. Freire rejected this technocratic method with respect to teaching literacy, and aimed to teach “adults how to read in relation to the awakening of their consciousness... [he] wanted a literacy program which would be an introduction to the democratization of culture, a program with men [*sic*] as its Subjects

rather than as patient recipients” (Freire, 1973, p. 43).

Similarly, this study sought to deepen participants’ “understanding of society [leading] to engagement in social movements, at whatever level people are capable of participating given the daily struggles for survival” (Gutstein, 2006, p. 25). Gutstein (2006) viewed “writing the world with mathematics as a developmental process, of beginning to see oneself capable of making change, and...developing a sense of social agency (gradual growth)” (p. 27). The research sought to identify how participants described their gradual growth of understanding and engagement with mathematical and financial literacies.

### On Personal Flourishing

Grant (2012) explained how to cultivate a more robust social justice vision of education, and argued for a democratic education for a flourishing and whole life. Brighthouse (2006) and Grant (2012) described how, in order to make meaning and sense of important aspects of their lives, individuals should experience personal flourishing and personal autonomy. They must also develop the confidence and skills to contribute to society and to the (broadly defined) economy, democratic competency, and the facility and desire for cooperation (Grant, 2012). Personal flourishing also includes living and doing well, having a positive identity, having family and friends as support mechanisms, financial stability, education, and a commitment to children’s flourishing minds.

### On Quantitative Literacy

Steen (2001) described elements and expressions of quantitative literacy (QL) that included confidence with mathematics, being able to use mathematics in context, expressing quantitative literacy through citizenship (e.g., understanding data, projections, inferences etc.), the application of mathematics in one’s educational trajectory, the application of quantitative literacy in one’s personal finance and management, and the ability to make quantitative decisions with respect to one’s personal health (e.g., options, dosages, risks, nutrition and exercise data etc.). Quantitative Literacy “empowers people by giving them tools to think for themselves, to ask intelligent questions of experts, and to confront authority confidently. These are skills required to thrive in the modern world” (p. 2).

**Table 1: Framework for NMFL Educational Research**

Assessing NMFL Educational Research	Description
Theme 1) Financial Knowledge	Data were coded this way when participants indicated a shift in financial knowledge or skills, or described their financial knowledge.
Theme 2) Re-Imagining Self and Possibilities	Data were coded this way when participants examined their assumptions and either realized that things should change, that things could change, or that they were not alone in the struggle for change. This theme represented a shift in beliefs about what was possible and about their agency.
Theme 3) Taking Action	Data were coded in this category when participants felt so strongly about the possibilities for change that they took action. These shifting practices were realizations of their beliefs about their agency.
Theme 4) Impact on Family	Data were coded in this theme when participants described the impact of the COY project on their relationships with other members of their family, including their ability to communicate with their children and impact their children’s financial futures.
Theme 5) Features of the COY Program	This theme includes data that described how and why the structures of the COY program were beneficial.

### Conceptual Framework

Though Grant (2012) did not write about mathematics education in particular, he advocated for core practices that would help cultivate flourishing lives while describing a robust social justice vision of education. I applied Grant's work to educational research, and in particular, to a Freirean approach and empowering pedagogy, attending to quantitative literacies that I refer to as NMFLs. I invoked some of Steen's *Elements* and *Expressions* of Quantitative Literacy to connect both Grant's and Steen's works together to create a framework through which I could study NMFL educational research. Table 1 shows some of the parallel ideas in both authors' works. This framework was used to analyze the data collected in this study.

### Methodology

#### On Freirean Research and Pedagogy

The theoretical and methodological grounding for this study is decidedly Freirean. Freire's (2000/1970) work originated in an historical place and reality that required emancipatory action in order to free the oppressed from their illiteracy, and his works became symbolic for many marginalized people around the world. Educators and educational researchers have used *Pedagogy of the Oppressed*, and its liberatory practices, in situations that were not necessarily as political, but that arguably required a similar research approach. Freire described the ideas of human agency and empowerment as being essential to worthwhile learning and research practice. Critical social theorists were to take an ethical and political position using theory of education as a "practice of freedom" (Glass, 2001, p. 22) to shape a just and democratic society. Grant (2013) reminded us that social action is "individual or group behavior that involves interaction with other individuals or groups, especially organized action towards social reform" (p. 926). The goal of this project was to act to make financial decision-making and numerical empowerment accessible for the participants in this community of families.

#### The COY Project – Resources

A series of children's books on Financial Literacy were provided (e.g., Phillips, 2010) as well as adult and teen financial literacy books by Gail Vaz-Oxlade. The adults' Financial Literacy course was based on *Momentum* (see Table 2 below), a curriculum that was developed in Calgary, Canada (2010), and was provided free of charge by a local non-profit community partner. I designed and led this research project; however, it resulted from the collaborative efforts of several groups including the local university's Faculty of Education and four non-profit community partners.

**Table 2: Financial Literacy Curriculum Materials – Momentum (2010)**

Topic	Content
Assets	set short- and long-term goals for 5 types of assets (human, personal, social, physical, and financial)
Credit	take charge of it, develop an awareness and understanding of advantages and disadvantages of credit, wise use, and consumer credit tools
Budgeting	learn the difference between needs and wants, identify and track spending habits, build a budget and set short- and long-term goals
Consumerism	awareness of effects of consumerism and advertising, and develop ability to control consumerism, and live more simply
Banking	become aware of banking account options and benefits, learn how to use banking services, and access banking tools and resources

The COY project consisted of eight meetings on Wednesday evenings in the school's library. A meal and refreshments was available for participating adults and children. Funds for purchasing and preparing meals were raised by a group of college students from a local institution. The Math Camp curriculum was designed and implemented by the volunteer teacher candidates who participated as Math Camp Leaders. Various mathematics and financial literacy activities were personalized for the school-aged children who attended. Pre-school-aged children attended a child-care service provided free of charge by the school community. Adults participated in a Financial Literacy course; the facilitator was associated with a non-profit agency whose mission was to provide instruction in financial literacy at no charge.

### **Data Collection and Procedures**

The proceedings of the adult financial literacy course were digitally recorded, as were individual pre- and post-interviews. Adults were asked three questions at the beginning of the program in an informal interview setting that was selected by each participant (either at their homes, in the school, or at a coffee shop). They were asked six questions at the end of the program. These were digitally audio-recorded. Each participating adult was interviewed for approximately 35 minutes at the beginning and at the end of the program. The semi-structured interview questions asked early in the program (pre-survey) dealt with the perceived quantitative needs for the families involved and the immediate community, the kind of mathematical learning and support the participants would appreciate, and the predicted benefits of the program. Near the end of the program, similar questions were asked (post-survey), including what kind of support was preferred, what were the benefits and disadvantages, and which specific teaching strategies, advice, structures, or "technologies" were believed to be of most benefit.

### **Data Analysis**

After transcription and multiple readings of the text, the data were coded and classified into the framework's themes, as shown in Table 1. After initial data coding, the results were analyzed with respect to the research questions and the literature using *systematic combining* (Dubois & Gadde, 2014), and the data categories were clarified. Theory building involved the development of a research framework by critically evaluating emerging constructs against ongoing observations refining and re-combining theoretical ideas with empirical data.

## **Results and Analysis**

This research study sought to determine whether participants could express personal flourishing within the context of numerical, mathematical, and financial literacies. As evidenced from the participants' responses, their beliefs, skills, knowledge, and actions could be classified into five themes that are supported by Grant's (2012) description of cultivating flourishing lives, and Steen's (2001) quantitative literacy, and are supported by literature (e.g., Freire, 2000; Gutstein, 2006). The five themes discussed here, and reflected in the participants' voices are 1) Financial Knowledge, 2) Re-Imagining Self and Possibilities, 3) Taking Action, 4) Impact on Family, and 5) Features of the COY Program.

### **Theme 1 Sample) Financial Knowledge**

For this theme, participants made sense of important financial aspects of their lives, and described their financial knowledge:

Consumerism, everything that you see out there is an ad. You are bombarded on television, media, print, advertising: "You deserve it, it's about you! You're entitled to this. You've worked hard. Enjoy it! Spend it! Here's a way that we can make it more affordable to you. People are sucked into this, and they are really not aware of it until it's too late, and that's for me, what I

think this community, city, province, country, nation, I'm not going to say the world, it's North America that's got the problem. (Brent's Post-Interview)

Brent described his place in the larger picture of consumerism (one of the topics in the Momentum course). He understood and interpreted consumerism in his world.

### **Theme 2 Sample) Re-Imagining Self and Possibilities**

For this theme, participants described beliefs of agency and confidence. During Valerie's post-interview, she described how she now felt that she had the ability to accomplish something of value:

I finally felt that I had hope for the future and less of a defeatist attitude, because of what we had learned, we can make as small or as big of a change as you want, and any change would be better than where we were at. (Valerie's Post-Interview)

### **Theme 3 Sample) Taking Action**

For this theme, participants engaged in, participated in, and contributed through personal agency in society. This theme describes adults who take action on their beliefs. During Carolyn's post-interview, she described how the COY program gave her the skills and understanding to run her household budget as well as the family's business budget. She explained:

I got the financial support that I needed to start and maintain a budget. My household budget – I run my business budget as well. It will have an impact on my husband because I do run the household budget. It will have accountability impact on him. Instead of going with the flow, there will be more proactive planning involved. (Carolyn's Post-Interview)

### **Theme 4 Sample) Impact on Family**

This theme describes adults who have the dispositions and communication skills to make decisions or take social action to contribute to society and participate in the democratic process. During Brent's post-interview, he described his parenting role as also the role of being a teacher for his children:

I've always believed that I'm not just raising my kids but I'm teaching my kids to be a good parent, so there's a responsibility and there are tools in the program that now I can use to explain finances to them. (Brent's Post-Interview)

### **Theme 5 Sample) Features of the COY Program**

This theme describes features of the Count On Yourself program that the participants felt were beneficial. This included specific topics and the content of the Momentum curriculum, and mostly the structure of the program including the importance of providing a safe, trusting, and inclusive environment for all members of the family:

The researcher and facilitators were willing to be there, to be involved and share in personal experiences. It was obvious to everyone that you were excited about what you were doing and, because of your enthusiasm it's easier for us to be excited about it when we see your enthusiasm because we can see that it matters to us, and your ability to educate us, and to see the children all excited about learning? That's priceless! (Ema's Post-Interview)

## **Discussion**

The participants were able to make meaning and sense of numerical, mathematical, and financial literacies in context. They developed knowledge from each other and made sense of those ideas throughout the process of the financial literacy course and curriculum. Guba and Lincoln (2005) reminded us that, as critical theorists, we continue to seek the active construction and co-construction

of knowledge by human agents. As a group and individually, the participants made sense of financial knowledge and stresses in their lives and in each other's. Guba and Lincoln (2005) also stated that: "Critical theorists, especially those who work in community organizing programs, are painfully aware of the necessity for members of the community, or research participants, to take control of their futures (p. 202)". One of the participants used this very language to describe how she felt that the COY program helped her take control of her live and *give herself a future*.

In other data gathered, participants demonstrated their financial literacy by indicating that they successfully managed their money by paying their bills on time, making sure they didn't spend more than they earned each month, and paid their debts when they owed money. They became more knowledgeable about credit scores, being more in control of finances, and budgeting. Participants also displayed more agency and self-confidence with finances. Being heard was essential for this. The practice of "letting research participants speak for themselves" (Guba & Lincoln, 2005, p. 209) allowed them the voice to tell me they felt empowered themselves, in their ability to speak to their children, and that their children also felt empowered as individuals.

Guba and Lincoln (2005) discussed the validity of a study as *catalytic authenticity* when the researcher creates capacity in participants for positive social change and forms of emancipatory community action. Grant (2012) also spoke of the researcher's ability to encourage social action. In this study, there is evidence that the participants appreciated the community aspect of the project, and took action by visiting banks and credit unions, investment groups, and mortgage brokers. They began budgeting processes online and using software, contacted credit companies to ask for a reduction in their interest rates, opened separate bank accounts to better keep track of their expenses, consolidated their debt, and applied for loans. The exit survey supports this data indicating that all of the participants not only felt comfortable getting help, but also did get help with their finances. Taking action is powerful evidence of emancipation, and by taking action in the ways that they did, the participants showed evidence of practicing democracy.

Perhaps the most significant result of this project was the belief from participants that they had influence upon their children. Though not all families participated as complete units, those who had children in the COY program felt more able, and did discuss financial information with their children when appropriate. All participants agreed that they found value in the program and would recommend it to someone else. The implications for this result is that programs such as Count On Yourself, that involve the whole family, might possibly help break cycles of poverty in communities in which they are implemented. As I continue to consider Grant's (2012) vision, I am struck by his statement that:

...you learn about how the practice of democracy can be made to work for you or against you and that it is important that you understand the differences as well as you know what you can do to influence an outcome that befits those who are marginalized. (p. 925)

Grant's intent was to clarify what it means to practice democracy. I find that this statement is reflected both in my practice as a researcher and in the evidence that was produced from this study through the voices of the participants. I entered this work to make a difference and to provide a learning space for families who could participate more democratically in society because they chose to learn to be more financially literate. I have learned that I can make a difference, and they have learned that they can make a difference in their own life situations. This most certainly reflects Grant's "practice of democracy" (p. 925).

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