

Adult Learning and Numeracy: Introduction

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Many adults are mathematically ill-prepared for the future. Globalization and rapid changes in technology have created a need for adults to update their skill sets for career sustainability and to process a myriad of information for decision-making as world citizens. In these tumultuous economic times, strong mathematics skills enhance employability by increasing job performance, productivity, and access to further education and training. According to a report conducted by the Confederation of British Industry (2009), 735 surveyed employers identified workers' poor mathematics skills as negatively impacting customer service and expressed concern over the low technological abilities found in the available workforce. There is predicted to be a 38% increase in the number of science, mathematics, engineering, and technology occupations between 2008 and 2013 (U.S. Department of Education, 2000). The products, services, standards of living, and economic and military securities depend on citizens having the necessary mathematics and sciences skills. In the data-driven culture of the United States, basic calculation, estimation, data analysis, and probability interpretation are all necessary for active participation in a civil society. Patient numeracy is necessary for healthcare decision-making including self-managing the chronic conditions of a disease and analyzing the risks and probabilities of medical interventions. An understanding of appropriate quantitative reasoning is crucial for examining complex concepts, such as a cost-benefit analysis of proposed universal healthcare legislation. This critical numeracy self-empowers decision-making by avoiding an indiscriminate dependence on "experts" who may be using politically skewed quantitative arguments. Steen (1990, pp. 211-231) punctuates this susceptibility coming with innumeracy, "An innumerate citizen is as vulnerable today as the illiterate peasant of Gutenberg's time."

American Adults Have Low Numeracy Dispositions

A numerate citizenry is every bit as essential as a literate citizenry. Regardless of this reality, only 20% of United States males believe low numeracy skills limit their ability to obtain a job and 80% believe innumeracy has no effect on their job opportunities (Steen, 2004). American adults have low numeracy dispositions which are the attitudes and beliefs to value numeracy as a

way of thinking, and the ability to perform numerate activities (Blair, 2006). The Adult Literacy and Lifeskills (ALL) Survey (2005), a representative sampling of 16-year to 65-year olds from five nations, ranked the average numeracy of U.S. participants below every other nation studied, except Italy. Both the International Adult Literacy Survey (IALS) and the Program for International Student Assessment (PISA) found the United States to have the largest variance between the highest and lowest numeracy levels of its citizens, when compared to other nations in these comprehensive studies (Kirsch, 2001; National Center for Education Statistics, 2004). International comparisons and national assessments determine the numeracy achievement of U.S. adults to be feeble and this innumeracy will prevent Americans, and America, from reaching higher (National Commission on Adult Literacy, 2008).

Numeracy is Marginalized within Education

The mathematics learning of adults, including numeracy, is marginalized within education. The reason for adults to learn mathematics is determined outside mathematics education. However, what is recognized as the necessary mathematics for adults is defined outside of adult education. An argument can be made that the mathematics needs of adult learners are disregarded by all dimensions of adult education. The problem is adult education subsumes adult mathematics learning under the umbrella of literacy. As well, adult education policies, research, and professional organizations prioritize reading and writing issues above those of numeracy. The United States Department of Education website acknowledges, "Reading has been the primary emphasis in building research-based knowledge about how adults learn and improve their literacy skills...The role of adult basic education in strengthening mathematics skills is central to the U.S. Department of Education's vision for adult education," (Office of Vocational and Adult Education, 2009). Contrary to the above statement, the amount of funding directed to issues around numeracy is minimal. A search of the 2002-2008 project awards by the National Center for Educational Research (2008) revealed only one title, *An Economical Improvement in Literacy and Numeracy*, involved numeracy. On a compilation of national initiatives relevant to professional development in adult literacy, a single numeracy emphasis is listed: *TIAN Project: Teachers Investigating Adult Numeracy* (Association of Adult Literacy Professional Developers, 2007). Likewise, the field of mathematics education shows little regard for numeracy learners. Tout's and Schmitt's (2002) survey of ERIC (Educational Resources Information Center) found just 17 out of 10,000 mathematics education articles were related to adult basic education, of which 9 were published in the United States. Safford-Ramus (2000) looked at the 113 dissertations in adult mathematics education from 1980 to 2000 to find 34 situated at an adult basic education (ABE) level.

Most of the attention to mathematics in our adult education delivery system is directed at preparing for the General Educational Development (GED) credential. Curriculums and pedagogy rely on traditional learning strategies of repetition, memorization, and standardized tests (Tout & Schmitt, 2002). The numerate behavior required of ABE learners is a passive reception of procedures oriented to a passing score on the GED exam. Numeracy is not a priority because it is not directly prioritized within the NRS (National Reporting System). This

accountability requirement of the federally funded, state-administered, adult education delivery system mandates educational gains to be the core outcome measure. The implementation guidelines define the concept of educational gain as “educational functioning levels in reading, writing, speaking, and listening and functional areas,” (Division of Adult Education and Literacy, 2007). Adult education delivery systems privilege funding, services and attention into reading and writing, which has higher accountability in the NRS, and away from numeracy education.

Numeracy is disenfranchised within the adult education system and must be recognized as separate from, but as worthy as, literacy. Adult education needs to lead the charge against innumeracy and include all participants in the process of adults learning mathematics - students, teachers, employers, and government officials, to name a few. This special edition of *Adult Learning* examines the following questions concerning these spaces between adult education, mathematics education, numeracy, and active citizenship:

What is numeracy? In addition to the word “numeracy”, the literature references many terms such as “adult mathematics”, “functional mathematics”, “workplace mathematics”, and “quantitative literacy”. In the first article, Gail FitzSimons clarifies the domain of numeracy, defines its space in relation to other mathematics discourses, and discusses the implications of this position for adult numeracy practitioners.

How should mathematics teaching be structured for adults to acquire this mathematical knowledge and skill? The second article addresses the question of what formal mathematics adults need to learn. Katherine Safford-Ramus looks at the points of divergence between the national policy recommendations, the school mathematics reform standards, and the numeracy content relevant for adults. Next, José María Menéndez and Marta Civil write about their experiences facilitating school “Tertulias Matemáticas” (Mathematical Circles) in a predominantly Latino neighborhood and how these examples of nonformal adult education are furthering the mathematical content knowledge of the parents. Family numeracy is beginning to be leveraged as an informal opportunity for adult numeracy education. In *Parents Learning Mathematics: For Their Children, From Their Children, With Their Children*, Ginsburg, Rashid, and English-Clarke suggest ways numeracy educators can use a parent’s desire to support their children’s learning, in combination with the children’s school materials, as resources for building numeracy skills in adults.

What should professional development look like so adult numeracy instructors increase not only their pedagogical knowledge, but also their own mathematics content knowledge? Bingman and Schmitt present the National Science Foundation project, Teachers Investigating Adult Numeracy (TIAN). Their framework builds conceptual understandings in teachers which translate into instructional practices that help adults connect mathematical ideas, communicate mathematically, and transition to work and postsecondary education.

Finally, **how are other countries addressing issues around adult innumeracy?** Vox Senior Advisor Svein Kavlø introduces the Norwegian national initiative for funding basic adult numeracy research and shares several internet resources addressing the need for instructional

materials at the lowest numeracy levels. To strengthen numeracy in the workplace throughout the United Kingdom, numeracy examinations are being incorporated into nurse education programs. Coben, Hodgen, Hutton and Ogston-Tuck report on an exploratory study to evaluate the teaching, learning, and assessment in the safety-critical context of healthcare workplaces. In the final article, Hassi, Hannula, and Salo i Nevado contrast Finland's first place ranking on the international assessment of mathematics skills, the PISA, with the country's challenges of a future labor shortage and a need to educate large numbers of older adults with low numeracy levels.

Conclusion

Individuals need mathematical understanding to participate in the democratic process. Despite this importance, mathematics has conflicting roles in adult education. On an individual level, a lack of mathematics can be a source of disempowerment for adults. Mathematics becomes an academic skill gatekeeper to adult employability. Low mathematical literacy is a barrier to both adult employability and recurrent education needs in the global workplace. On a societal level, mathematics can be a means for dominant cultures to marginalize subgroups within societies. Instead of bringing emancipation to non-dominant groups, mathematics can be used to control subgroups' entry into occupations -- denying them full social and political participation. Mathematics and social stratification interact. My hopes are this *Adult Learning and Numeracy* special edition will add to the research-to-practice crosswalk and encourage dialogue among adult education practitioners regarding these matters on adults learning mathematics.

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