Daniel J. Jinguji Statement of Purpose danjj@uw.edu

Work History

Most of my professional life has been spent as an educator: first in industry, at Boeing and Microsoft, and more recently in academia. Also, a good deal of my volunteering has also been within the general realm of teaching, both in religious education and English as a Second Language / US Naturalization preparation, working with diverse populations ranging from preschoolers to low-income seniors. With a Master of Science in Computer Science, my professional work has centered in teaching computer-related topics, primarily programming and software development.

While at Boeing, my primary job was in course development and delivery in the in-house education and training organization for Boeing Defense and Space Group. While at Microsoft, most of my time was in support of education regarding programming tools. Initially, I was hired as a senior subject-matter expert at Microsoft University (MSU), the educational “arm” of Microsoft which was formed to teach others how to write programs for Windows. With my educational background from Boeing, I also served as an instructional designer in MSU. From there, I moved to the user education (documentation) group for the primary programming tool, Visual Studio. While I was at Boeing, I was also a regular speaker at regional and national symposia for Digital Equipment Computer User Society offering eight-hour-long seminars. During my tenure at Microsoft, I frequently presented / represented the programming products at trade-shows and conferences, both national and international. In these presentations, the goal was to take some body of technical information and present it in an engaging, memorable, and compelling way. Since the dot-com melt-down in 2000/2001, I have been teaching in academia, primarily at North Seattle Community College (NSCC).

A Research Question

The programming students I teach are generally highly interested and motivated in the topic, since their future, either employment or admittance into their chosen academic program, depends on their success in these classes. Even with this relatively high degree of buy-in, student performance varies all over the board. I haven’t noticed any clear pattern to explain this variation in student achievement, but there does seem to be a “something” that enables some students to address programming problems more successfully than others. As intriguing as this is, I could see no structured means of exploring what the nature of that “something” might be, let alone how it might be taught or fostered.

The issue of the process of problem solving in computer programming appeared in a new form recently, because I have been very actively involved in the application process for NSCC to offer a four-year Bachelor in Applied Science degree in Application Development, particularly in terms of the proposed curriculum.

Graduate Studies

At the same time, as a state employee, I have taken advantage of the tuition-exemption program to pursue a long-standing interest of mine, Linguistics. In the process, I have found that I am an *amateur* linguist in the classic sense of the term: a lover of the field, but without the drive or desire to make it my profession. However, my studies in linguistics did open my eyes to the on-going research in the area of language acquisition. This dovetails very nicely with my personal leanings in academic inquiry: more toward the application of science in everyday life, rather than the pursuit of truth as an end unto itself. In fact, second language acquisition was such a good fit for me that I have started the Master of Arts in Teaching (English to Speakers of Other Languages) (MATESOL) program here at UW.

Qualitative Research

I had a transformative educational experience last spring, when I started working on the MATESOL degree, taking one of the core classes, ENGL 574, Research Methods in Second Language Acquisition. The primary thrust of this course is an examination of qualitative research methods within the context of language acquisition. These qualitative research methods and the related post-positivist points of view open avenues to research that which is essentially opaque to classic quantitative methods. Now, at last, I had a means to research the “something” that had long fascinated me.

Learning Science

As it turns out, I had happened upon the Learning Science webpage just over a year ago and was very intrigued by what I found there. The content of the former website seemed to be describing my interests to a tee. However, at that time, I could see no way to research the “something” that led to programming success. Now, my recent exposure to qualitative methods has changed my perception about how reasonable and tractable this research area could be. This was further confirmed by my first CoE class, in autumn 2013, EDPSY 501. So, I’m applying for the PhD program in Learning Sciences to pursue this question that has captivated my attention for so long.

Potential Research

To summarize, my primary research interest revolves around the process of problem solving used in creating computer programs. And, as my work history might suggest, that interest centers on adult learners and how they might acquire that process. A preliminary review shows relatively little literature about adult learners in STEM fields, which is promising, at one level. There is a significant body of literature regarding school-age students and the importance of metacognitive process for their success in STEM areas. Also, the second-language acquisition literature suggests marked differences in learning process between in adult and youth learners, with adults taking advantage of their cognitive skills in learning language where children seem to acquire language more implicitly. So, the proposed research may well merge these two research threads.

Even though I anticipate continuing to teach at NSCC while pursuing this doctoral work in education, I think the research work may target engineering students here at UW, for example, students of AMATH 301, Beginning Scientific Computing, which is essentially a programming class using MATLAB to perform applied numerical analysis. The population from which to draw is significantly larger than what would be available to me at NSCC, over 1,000 students a year. Moreover, the IRB may more readily approve the research since I would no formal academic relationship with (over) the potential subjects.

I have spoken briefly about this research possibility with Dr. Kara Johnson, who seems to be a very likely potential advisor for this work. Unfortunately, I have not yet been able to talk about it with Dr. Philip Bell, who is another likely potential advisor.

Closing Thoughts

I am excited by the possibility to explore metacognition and its relation to problem solving in adult learners, particularly in the realm of programming. Also, I believe that my varied background will help me contribute to the learning experience of the other students in the program, as well as grow personally and professionally through my interactions and research in the College of Education.

Thank you for the attention to this application. Please do not hesitate to contact me if I can provide any additional information that may help you in coming to a decision.

Respectfully yours,  
  
  
  
Daniel J. Jinguji  
Student ID: 7339426  
Email: [danjj@uw.edu](mailto:danjj@uw.edu)

Daniel Jinguji

Personal History Statement

A Research Question

As outlined in the personal history statement, the research question that prompts this application to the Learning Sciences PhD program revolves around the development in adult learners of skills in creating computer programs to solve novel problems. While I would be interested in other research questions, I have given some thought to how one might move forward with this particular topic.

Literature

In a preliminary review of the literature, there seems to be relatively little concerning adult learners, let alone adult problem solving skills. Actually, the apparent dearth of research in adult learners is actually a bit encouraging. It seems to be a relatively untapped field of research. With the current interest in STEM topics and the increasingly common phenomenon of adults engaging in education to prepare for “second careers”, it seems that this would be a reasonable area for research, though it may be less well funded than research with younger student populations.

Adult Learners

One area where there seems to be a reasonable body of literature about adult learning is second-language acquisition (SLA). It has long been recognized that young children seem to acquire language “organically”, simply by exposure to circumstances where there is communicative need in the target language. On the other hand, adult learners typically show marked “deficiencies” in SLA, most notably in phonology. Recent research shows that adult language learners benefit from instruction that can leverage their cognitive abilities.

Where young children apprehend and acquire distinctions implicitly, adults do better with explicit instruction regarding forms and their distinctions. As an example, the variation in second-person subject pronoun, based on number and formality: tu and vous in French; du, ihr, and Sie in German; tú, vosotros, Usted, and Ustedes in Spanish; where in English there is the sole contemporary form, you.

A common phenomenon in language acquisition, both first language learning by very young children and second language learning, is the memorization of chunks of language, stock phrases and sentences, particularly those that can be deployed in a number circumstances. For example, in Spanish, “Me gusta X.” is the chunk for “I like X.” “Me gusta la música.” (I like the music.) “Me gusta la comida.” (I like the food.) Later, as grammatical knowledge increases, the chunks are analyzed and one sees a Piagetian style restructuring of language knowledge. To continue our example “Me gusta X” does not form grammatical sentences with plural nouns. “\* Me gusta las enchiladas.” (I like the enchiladas.) This is because the apparent object (the patient, X) is the grammatical subject of the sentence, while the apparent subject (the agent, me) is expressed in the dative: “X is pleasing to me.” So, with a plural X, the verb must become plural: “Me gustan las enchiladas.” This dative structure is appears in a number of affective constructions in Spanish. So, this analysis not only helps with the appropriate grammatical form for this specific chunk, it also provides transfer to a number of parallel structures in the target language.

There is a significant amount of research in problem solving skills in young people. Here I cite findings from two studies with elementary school students, fifth grades, as it turns out. One study found that successful problem solving was positively correlated to metacognitive understanding of the problem space as evidenced by the content of the explanation of the problem to a peer. In the other study, intervention with metacognitive instruction was also shown to improve student outcomes, even when the metacognitive material was not directly related to the task being evaluated. So, metacognitive material may help prompt the analysis and restructuring of the knowledge used by the students.

Metacognition and knowledge restructuring is also dependent on having a sufficiently large body of knowledge to massage. So, work with entry-level students may be problematic. The students for the upcoming BAS degree may be a reasonable population, but the population is small: 25 per cohort for the initial years, projected to grow to 30 in the third year. If the application process becomes competitive, there may be relatively less variation within the student population. There are other potential problems. If I’m teaching in the BAS program, it may be more difficult to get the research approved through the IRB due to potential conflict issues. Moreover, the classes in the BAS program as currently scheduled to be offered only once a year. So, comparison between cohorts would be a long-term endeavor.

A more promising potential population for this study would be to draw from the students taking AMATH 301, Beginning Scientific Computing. It has a relatively advanced math prerequisite, second-quarter freshman calculus. So, the basic problem solving skills of the students should be adequate. It’s a large volume class, typically with more than 300 students per quarter during the academic year. It is essentially a programming course in MATLAB; so, a good deal of the work in the class is built on concepts of linear algebra and basic programming. In personal communication with instructors of this course, about half the students have background in programming and about half have background in linear algebra. So, about a fourth of the students sail through the class and about a quarter of the class struggles mightily. It shouldn’t be too difficult to find students who would be interested in tutoring for this class. Many of the qualitative research techniques are essentially analogous to standard tutoring techniques: for example, think aloud. As such, this will probably qualify for minimal-risk HSD approval.

While the BAS students may not be a reasonable population for the initial research, it does hold some interesting promise. The heart of the curriculum is a set of three sequences, each consisting of a more theoretical design class followed by a practicum class where the students implement a prototype of a project for a local industry. The sequences look at web applications, mobile applications, and cloud (software as a service) applications. These sequences may provide a reasonable platform for action research in this area following the completion of the PhD.

Thank you for the attention to this application. Please do not hesitate to contact me if I can provide any additional information that may help you in coming to a decision.

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