Proposal for the Study of School-based Makerspaces in New Jersey:

Geographic Dispersion as an Indicator of the Digital Divide

Deborah Nagler

New Jersey City University

Proposal for the Study of School-based Makerspaces in New Jersey:

Geographic Dispersion as an Indicator of the Digital Divide

Description of the Study

 Are school-based Makerspaces one more contributor to the Digital Divide? The Digital Divide often refers to the role of economics in creating a disparity in technology use. Similarly, the Digital Divide exist in STEM education and, ultimately, STEM-related careers. The *ASHE Higher Education Report* (2011) identified quality Science, Technology, Engineering, and Mathematics (STEM) education by quality teachers as two contributing factors to the success of “racial and ethnic minority students” in higher education and STEM-related careers (p.1).

 As public schools look to offer more authentic and active learning in STEM education, many are establishing school-based Makerspaces (Roscorla, 2013). Burke (2014) defines Makerspaces as areas that are dedicated to the sharing of “tools, knowledge, and ideas” (p. 2). Typically Makerspaces include some combination of computer workstations, 3-D printers, arts and crafts materials, and micro-controller projects (Burke, 2014; Martinez & Stager, 2013). Makerspaces require personnel, budgets, and professional development that may not be readily available in economically disadvantaged districts.

 The purpose of this study is to gather information on the locations and types of public schools in the State of New Jersey that are currently hosting or planning to found Makerspaces within the next three years. The data resulting from this study will be used to ascertain a base line for determining the growth of school-based Makerspaces, to profile the types of districts and schools most often hosting Makerspaces, and to clarify the role of the district administration in the development of Makerspaces. All of the above will be used to address the question of whether a pattern of growth currently exists in Makerspace development that perpetuates the Digital Divide.

Selection and Sampling

 This study will be undertaken with the purposive sampling of school districts throughout the State of New Jersey. New Jersey has 591 active school districts (DOE Data, 2014) in 21 counties (NJ.com, 2015) that include urban, suburban, and rural communities. Contact information for the superintendents of each of the school districts is public information, which is available on the New Jersey Department of Education website. The researcher will contact each superintendent via letter, introducing the project and requesting participation. The letter will indicate that an email will be forthcoming that will include a link to a brief survey about school-based Makerspaces in their district.

 Two issues may hinder the success of this endeavor: compliance and willingness to respond to an independent researcher. As an incentive to encourage participation, the researcher will offer participating school districts access to the research results, information on funding for school-based Makerspaces, and links to online resources. To address the issue of confidence in the research, letters of support from the New Jersey Library, LibraryLinkNJ, and one of the New Jersey education associations will be solicited and offered as references to the participants.

Research Questions

Q1. How many public schools within school districts in the State of New Jersey currently house Makerspaces?

Q2. To what degree does the geographic dispersion of Makerspaces in schools within New Jersey school districts favor urban, suburban, or rural school districts?

Q3. To what degree are schools with large racial or ethnic minority populations adopting Makerspaces?

Q4. To what degree is the district office involved in the founding, funding, and/or evaluation of school-based Makerspaces?

Need for the Study

 School-based Makerspaces are a relatively new subject for academic study. Basic demographic information, including the geographic location, type of school hosting the program, and the structure of the Makerspace is needed if researchers are to begin taking the full measure of the impact of this innovation. At present, very little demographic information is available. Nationwide, a 2013 Maker Education Initiative survey identified several dozen schools that had developed Makerspaces (Peppler, et al, 2013). This researcher found numerous articles that encourage the adoption of school-library based Makerspaces (Bruder, 2015; Colegrove, 2013; Lewis, & Loertscher, 2014; Moorefield-Lang, 2015), but few actual statistics about the distribution of these programs on a state-by-state basis, including the State of New Jersey.

 In the *Makerspace Playbook,* Hlublinka, et al (2012) point to the mission of the National Technology Plan (2010) as reflective of the goal of Makerspaces. This goal being to bring “state of the art technology into learning to enable, motivate, and inspire all students, regardless of background, languages, or disabilities” (p.x). The results of this demographic study of school-based Makerspaces throughout the State of New Jersey will be compared with available data about school location, population, and funding. If, for example, economically disadvantaged schools are found to be under-represented in development of school-based Makerspaces, it is still early enough in the evolution of this innovation to prevent it from exacerbating the Digital Divide.

Type of Research

 This study will take place as quantitative research, as an investigation of the current condition of public school-based Makerspaces in the State of New Jersey, specifically their number and geographic locations (Gay, Mills, & Airasian, 2012). The sampling design will be “single stage” (Creswell, 2014, p. 158), as the researcher will use the district superintendents as a reliable and accessible source for the type of information required. An electronic survey will be used for data collection. Wright (2006) describes the advantages of electronic survey as cost-effective, easily disseminated, and time-savers for the researcher. The convenience of answering an online questionnaire also increases response rate (Creswell, 2014). In addition, Qualtrics survey tool that will be used for this survey automatically aggregates data for ease of use in analysis.

 This survey will be cross-sectional (Creswell, 2014) and will examine only the current status of public school-based Makerspaces. The total number of active public school districts in New Jersey is 591. With the margin of error at +/-5%, a 95% confidence level, and a standard deviation of .5, the required number of responses will be 385 or 65% of school districts within the state (Smith, 2015).

The Survey Questions

 The first questions included in the survey will be short response questions that identify the respondent by name, district, and county. These questions cross-reference with Q1.

Next the respondent will be asked to choose a descriptor of the district as urban, suburban, rural, or other. This question cross-references with Q2. In the following questions, the respondent will be asked to provide information about all district schools currently hosting a school-based Makerspace: School name, Level (Elementary, Middle, or High School), Type of Makerspace (school-library based, free-standing, or other), Number of years of operation, Name and contact information for lead staff person. For each host school, the respondent will be asked to identify the school population in terms of its racial, ethnic, and economic mix. An additional question will ask for similar information about schools that presently do not offer Makerspaces, but intend to open them within the several years. These questions correspond to Q3. The final section of the survey will ask whether or not and in what ways the district was involved in the founding, funding, and evaluation of school-based Makerspaces.

References

Bruder, P. (2015). Make your space: The maker movement in education. *NJEA.* Retrieved from https://www.njea.org/news-and-publications/njea-review/march-2014/make-your-space

Burke, J. J. (2014). *Makerspaces: A practical guide for librarians*. Lanham, MD: Rowman & Littlefield.

Cresswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches.( 4th ed.).* Thousand Oaks, CA: Sage.

DOE Data. (2014). New Jersey public schools fact sheet. *State of New Jersey Department of Education*. Retrieved from http://www.nj.gov/education/data/fact.htm

Factors in K--12 Education That Influence the Success of Racial and Ethnic Minority Students in the STEM Circuit. (2011). *ASHE Higher Education Report*, *36*(6), 27-52.

Hlublinka, M., et al. (2013). Makerspace playbook: School edition. pdf. *Maker Media*. Retrieved from <http://makered.org/wp-content/uploads/2014/09/Makerspace-Playbook-> Feb-2013.pdf

Lewis, K. R., & Loertscher, D. V. (2014). The possible is now. *Teacher Librarian*, 41(3), 48-52.

Martinez, S.L. & Stager, G. (2013). *Invent to learn: Making, tinkering, and engineering in the classroom*. Torrance, CA: Constructing Modern Knowledge Press.

Moorefield-Lang, H. (2015). Change in the making: Makerspaces and the ever-changing landscape of libraries. *Techtrends: Linking Research & Practice To Improve Learning*, *59*(3), 107-112. doi:10.1007/s11528-015-0860-z

New Jersey On-Line LLC. (2015). New Jersey county and town pages. *NJ.com*. Retrieved from <http://www.nj.com/local/>

Peppler, K., Maltese, A., Kuene, A., Chang, S., & Regalla, L. (2013). The maker ed open portfolio project: Survey of Makerspaces part 1. pdf. *Open Portfolios*. Retrieved from <http://makered.org/wp->content/uploads/2015/02/OPP\_ResearchBrief6\_

 SurveyofMakerspacesPart1\_final.pdf

Roscorla, T. (2013). Why the ‘Maker Movement’ is popular in schools. *Center for Digital Education.* Retrieved from <http://www.centerdigitaled.com/news/Maker-Movement-> Popular-Schools.html

Smith, S. (2015). Determining sample size: How to ensure that you get the correct sample size. *Qualtrics*. Retrieved from https://www.qualtrics.com/blog/determining-sample-size/

Wright, J.B. (2006). Researching internet-based populations: advantages and disadvantages of online survey research, online questionnaire authoring software packages, and web survey services*. Journal of Computer Mediated Communication*,*10*(3), 00. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1083-6101.2005.tb00259.x/full