

Abstracts of Selected Publications for Villa

Villa, E. Q., Lesser, L., & Mein, E. (2022). Shifting precalculus from gatekeeper to gateway at a Hispanic-Serving Institution. In M. Voigt, J. E. Hagman, J. Gehrtz, B. Ratliff, N. Alexander, & R. Levy (Eds.), *Justice through the lens of calculus: Framing new possibilities for diversity, equity, and inclusion*, pp. 353-362. Mathematical Association of America.

An intervention was funded by the U.S. Department of Education to improve student success in the 5-credit hour precalculus course at The University of Texas at El Paso, a research university at the US-México border with an 80% Latinx student body. The intervention was a collaboration between UTEP's College of Education and the Mathematical Sciences Department in the College of Science. The four-year intervention developed and involved teaching assistants in structured and sustained professional development grounded in the equitable and inclusive pedagogical practice of cooperative learning in order to promote the creation of math-focused learning communities in the precalculus course. Findings indicate the intervention increased student pass rates and their success in the subsequent Calculus 1 course.

Mein, E., Esquinca, A., **Villa, E.**, & Monarrez, A. (2021). The affordances and constraints of social networks among Latina engineering students. In B. Irby, N. Abdelrahman, B. Polnick, & J. Ballenger (Eds.), *Women of Color in STEM: Navigating the Double Bind in Higher Education* (pp. 23-33). Charlotte, NC: Information Age Publishing Inc.

This chapter draws on case study methods to explore the affordances and constraints of Latinas engineering students' social networks in their academic and professional pathways in their development as engineers. Findings show the critical role of teacher-mentors in influencing students' academic and career paths; the paradoxical influences of familial networks; and the access to important apprenticeship experiences afforded by social networks.

Villa, E. Q., Hampton, E., Esquinca, A., & Guerra, H. M. (2020). "Is engineering for me?": Examining struggles and challenges of Latinas in undergraduate engineering studies. *Peace and Conflict: Journal of Peace Psychology: Special Edition—The Challenge of Being Latina, Personal, Political, and Economic—Education and Vocational Concerns*, 26(4), 403-413.

This paper focuses on Latinas in engineering and computer science undergraduate studies, whose lives have been challenged by endemic barriers rooted in systemic violence of the male-dominated field of engineering and its historical marginalization of women, especially women of color. Persistence in the field has largely been the burden of women rather than the institution itself, and it can be said then that the field of engineering is powerful in its ability to mediate identity-making via layers of historically rooted privilege, leading to discomfort and disillusionment. In a qualitative investigation of Latinas studying engineering in an institution on the U.S. border with Mexico, the strongest theme emerging was the adversity faced by Latinas, which posed a contentious climate for many of them. This paper illuminates the enduring and invisible symbolic violence imposed on Latinas in engineering undergraduate studies.

Villa, E. Q. (2018). Minority voices: Interrupting the social environment to retain undergraduates in computing. *Inroads*, 9(3), 31-33.

The low enrolment and graduation rates of underrepresented students in computer science, particularly those students who are women and Latinx is well documented and of deep concern to computer science educators, industry, and other stakeholders. This concern was the motivation for the ACM Education Board to establish the ACM Retention Committee, with co-chairs Alison Derbenwick Miller (Oracle) and Chris Stephenson (Google). The main charge of the committee was to collect and analyze data to gain deeper insights into programmatic issues of recruitment and retention of underrepresented students to broaden participation in computing. As a companion piece to this charge, the committee published a series of opinion pieces. This

article was the last in the series and presented a perspective from a minority voice in examining the challenges and opportunities for Latinx undergraduate students.

Villa, E. Q., Wandermurem, L., Hampton, E. M., & Esquinca, A. (2016). Engineering education through the Latina lens. *Journal of Education and Learning*, 5(4), 113-125. Doi: 10.5539/jel.v5n4p113

Less than 20% of undergraduates earning a degree in engineering are women, and even more alarming is minority women earn a mere 3.1% of those degrees. This paper reports on a qualitative study examining Latinas' identity development toward and in undergraduate engineering and computer science studies using a sociocultural theory of learning. Three major themes emerged from the data analysis: 1) Engineering support clusters as affinity spaces contributing to development of engineering identities; 2) Mexican or Mexican-American family contributing to persistence in engineering; and 3) Equity in access to engineering education. Engineering support clusters and Mexican heritage family support were vital in developing and sustaining Latinas' engineering identity. Additionally, data supported the idea that Latinas at the research site experienced gender and ethnic equity in their access to engineering education. The authors call for a more gender-inclusive engineering education and situating education experiences in more effective learning approaches (i.e., critical thinking in community and cultural contexts), which deserves attention in order to move engineering away from a ubiquitous view of inflexibility regarding women in engineering.

Villa, E. Q. (2017). Using in-depth interviews as a primary source of data for developing case studies. In B. Flett & F. Bronia (Eds.), *SAGE Research Methods Cases – Education*. London: Sage Publications, Ltd. DOI: <http://dx.doi.org/10.4135/9781473958043>.

The case study presented here highlights a unique method of collecting data for phenomenological qualitative studies. Drawing from many scholars in qualitative research, Irving Seidman developed this method of in-depth interviewing with attributes of validity and reliability. It is a time-intensive method in which three interviews are conducted, each 1 week apart, to allow participants to reflect on what they have shared in constructing meaning of their lived experiences. The first interview seeks understanding of the experiences and/or events leading to the phenomenon under study, such as the complex lives of critical care nurses or special needs teachers. The second interview explores their lives in the moment, while the third and last interview seeks participants' meaning of these experiences. Once these data are transcribed, a profile is developed using participants' exact words to develop a chronological story of their lives in the phenomenon under study in order to extract the essence of their contextualized lives for data analysis. For the case presented here, the phenomenon of investigation was to understand the lived experiences of Latinas who chose to study engineering at university.

Gates, A. Q., **Villa, E. Y.,** & Salamah, S. (2014). Developing communities of practice to prepare software engineers with effective team skills. In L. Yu (Ed.), *Overcoming challenges in software engineering education: Delivering non-technical knowledge and skills* (pp. 52-70). Hershey, PA: IGI Global.

A major challenge to teaching software engineering is achieving functioning teams that enforce individual accountability while integrating software engineering principles, approaches, and techniques. The two-semester, software engineering course at the University of Texas at El Paso, referred to as the Team-Oriented Software Engineering (TOSE) course, establishes communities of practice that are cultivated through cooperative group practices and an improvement process model that enables learning from past experiences. The experience of working with incomplete, ambiguous and changing software requirements motivates the need for applying disciplined software engineering practices and approaches throughout project development. Over the course of the two-semester sequence, the nature of students' participation in project teams changes, they begin to influence others in software engineering practice, and their identities as software engineers begins to develop. The purpose of the chapter is to describe how to structure a software engineering course that results in establishing communities of practice in which learners become increasingly more

knowledgeable team members who embody the skills needed to work effectively in a team- and project-based environment.