Board 210: AMPLIFY Institute: A Professional Development Program Designed for and with Engineering Instructional Faculty

Julian Rodrigo Sosa Molano, Florida International University

Julian is a graduate research assistant at Florida International University. He holds a BSc in Electronics Engineering from Javeriana University in Colombia and a MSc in Electrical and Computer Engineering from The University of Arizona. He is pursuing his PhD degree in Engineering and Computing Education at Florida International University. He has professional experience in Information Technology, Semiconductors, and Telecommunications in international companies like Ecopetrol, Texas Instruments, and Ericsson. His research interests focus on inclusive STEM learning and teaching methodologies for students with physical disabilities.

Mr. Henry Salgado, University of Texas, El Paso

Henry is a graduate research assistant at The University of Texas at El Paso, pursuing a combined MS/Ph.D. in Computational Science. Previously, he completed an MS in Engineering with a concentration in Computer Science and Engineering Education. Henry's research interests lie at the intersection of computational science, machine learning, and engineering education.

Gemma Henderson, University of Miami

Gemma Henderson is a Director of Learning Platforms at the University of Miami, and previously held a position as a Senior Instructional Designer in the Learning Innovation and Faculty Engagement team. Gemma partners and consults with faculty, academic units and other university stakeholders across the University focusing on curriculum development and digital pedagogies. Gemma engages in information technologies and educational initiatives to enrich undergraduate and graduate courses on behalf of Academic Technologies. Gemma currently serves as the Curriculum Development Lead in a collaborative research project, funded by the National Science Foundation, with faculty at the University of Texas El Paso, University of Miami, and Florida International University focused on undergraduate engineering education at Hispanic Serving Institutions.

Dr. Alexandra Coso Strong, Florida International University

As an assistant professor of engineering education at Florida International University, Dr. Alexandra Coso Strong works and teaches at the intersection of engineering education, faculty development, and complex systems design. Alexandra completed her graduate degrees in Aerospace Engineering from Georgia Tech (PhD) and Systems Engineering from the University of Virginia (UVa). Prior to attending Georgia Tech, Alexandra received a bachelor's degree in aerospace engineering from MIT and a master's degree in systems engineering from the University of Virginia. Alexandra comes to FIU after completing a post-doctoral fellowship at Georgia Tech's Center for the Enhancement of Teaching and Learning (CETL) and three years as a faculty member at Olin College of Engineering in Massachusetts. Alexandra's research aims to amplify the voices and work of students, educators, and Minority-Serving Institutions (MSIs) overall and support continued educational innovation within engineering at these institutions. Specifically, she focuses on (1) educational and professional development of graduate students and faculty, (2) critical transitions in education and career pathways, and (3) design as central to educational and global change.

Ines Basalo, University of Miami

Dr. Basalo is an Assistant Professor in Practice in Mechanical and Aerospace Engineering at the University of Miami. Prior to joining the University of Miami in 2014, she worked as an adjunct professor at Columbia University and the Cooper Union in New Yo

Mr. Viyon Dansu, Florida International University

Viyon had his Bachelors and Masters' degrees in Systems Engineering at the University of Lagos Nigeria. He co-founded STEM-Ed Africa, a social enterprise involved in developing student's problem-solving abilities in STEM. He is currently a PhD student of engineering and computing education at Florida International University, Miami.

Dr. Meagan R. Kendall, The University of Iowa

An Associate Professor at The University of Texas at El Paso, Dr. Meagan R. Kendall is a founding member of the Department of Engineering Education and Leadership. With a background in both engineering education and design thinking, her research focuses on how Latinx students develop an identity as an engineer, methods for enhancing student motivation, approaches for faculty leadership development, and methods for involving students in curriculum development and teaching through Peer Designed Instruction.

Dr. Brett Tallman, University of Texas, El Paso

Brett Tallman earned his doctorate in Engineering at Montana State University (MSU), with focus on engineering leadership. His previous degrees include a Masters degree in Education from MSU (active learning in quantum mechanics) and a B.S. in Mechanical Engineering from Cornell University. He comes to academia with over two decades of industry experience, including quality engineering with Toyota and managing his own consulting practice in biomedical and product design.

Yamile Aidee Urquidi, The University of Iowa

Yamile is a graduate research assistant at The University of Texas at El Paso, pursuing masters degree in Engineering with concentrations in Environmental Engineering and Engineering Education. Yamile research interests center around the intersection of e

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Introduction

Engineering Instructional Faculty (EIF) members working at Hispanic Serving Institutions (HSI) hold pivotal positions in the development of support programs, targeted initiatives, and inclusive curricula for full-time undergraduate Hispanic/Latinx-identifying students at HSIs. HSIs are two- and four-years college and universities where the Latino enrollments represent 25% or more of the total of full-time students [1]. HSIs are Minority-Serving Institutions (MSI) with the highest growing pace. In fact, given the reliance on enrollments for their designation, the number of HSIs has doubled since 1994 passing from 189 to 409 [1]. Our research is particularly interested in EIFs, faculty that are primarily evaluated on their teaching responsibilities and may be off the tenure track. According to the Government Accountability Office (GAO), the percentage of the Non-Tenure Track (NTT) faculty teaching in 2015 was 61% at four-year universities, and they were responsible for lecturing between 45% and 54% of all courses [2]. The instructional faculty at both two-year and four-year institutions account for a substantial proportion of the total faculty, ranging from 25% to over 50%. These individuals play a crucial role in shaping students' education and academic success [3]. Despite the high contact number of hours and the overall impact these faculty play in Latinx student success, EIF at HSIs remain an under-explored population in the academic literature [3].

The AMPLIFY Project, funded by the National Science Foundation's (NSF) HSI program, was designed to better understand and amplify the perspectives and experiences of EIF serving at HSIs. The project aims to identify the learning experiences that support EIF educational change, define a framework for how to support the educational change leadership development of EIF, and design and implement a professional development program, the AMPLIFY Institute. The design of the AMPLIFY Institute is based on a goal to develop a self-sustaining faculty development program that empowers engineering instructional faculty and enhances their leadership of educational change across HSIs. From our initial exploration of the experiences of EIF at HSIs through a case study of EIF from six different HSIs, our research team has obtained valuable insights to guide the design and implementation of the AMPLIFY Institute. Specifically, the results demonstrated how EIF faculty value work-life balance [4], view supporting students as central to their role and professional development [5] and often employ culturally responsive techniques to help students succeed [6]. Additional insights suggest EIF have a high sense of enthusiasm for learning, teaching, and the engineering discipline, contributing to their motivations for pursuing and maintaining their instructional faculty positions [7]. The purpose of this paper is two-fold: 1) to present the project's transition from the multiple case study to the implementation of the AMPLIFY Institute and 2) to identify the learning experiences that support EIF leadership development.

AMPLIFY Institute Overview

The AMPLIFY Project was designed to understand the experiences and perspectives of EIFs at HSIs. Through this understanding, the project activities are designed to support the educational leadership development of EIF, develop a model that amplifies the EIF leadership of educational change at HSIs, and make visible the features and necessary content of faculty development programs that promote educational innovation at HSIs. The AMPLIFY Project seeks to answer four research questions, two of which were central over the last year of the project (3 and 4):

1) What factors impact the self-efficacy and agency of EIF at HSIs to engage in educational change initiatives that encourage culturally responsive, evidence-based teaching within their classrooms, institutions, or beyond?
2) What are the necessary competencies for EIF to be leaders of this sort of educational change?
3) What individual, institutional, and professional development program features support the educational change leadership development of EIF at HSIs?
4) How does engagement in leadership development programming impact the EIF educational leadership self-efficacy and agency toward developing and using culturally responsive and evidence-based approaches at HSIs?

The AMPLIFY Institute is a program designed to support the educational leadership development of EIF. The AMPLIFY Institute is geared towards full-time faculty with a teaching focus, including those not on a tenure track, such as teaching professors, professors of practice, and assistant professors. The AMPLIFY Institute consists of two components: 1) A two-day workshop and 2) follow-up virtual coaching sessions.

The AMPLIFY Institute brings together EIFs from different HSIs for interactive activities on leadership and educational change and helps fellows scope a change project to work on throughout the rest of the program. The workshop is grounded in a design thinking approach to curriculum development that emphasizes interactive prototyping of concepts for influencing educational change. The coaching sessions [8] are six 1.5-hour virtual sessions guided by the AMPLIFY Institute team through powerful questions and group exercises to help fellows in their agency process towards educational change.

The AMPLIFY Institute, therefore, seeks to collaboratively support the development of an engineering educational system at HSIs that is inclusive, culturally enhancing, self-sustaining, and transformative. The AMPLIFY Project team began by leveraging their previous work collaboratively identifying research needs of engineering at HSIs, as part of a participatory workshop design. The workshop participants were thirty-six faculty from thirteen HSIs across the United States. During such work, the research team concluded there is need for a professional development approach that embraces a comprehensive knowledge of the experiences of EIF faculty, the constructs of instructional self-efficacy [9] and agency [10]. To address the identified needs, the team initiated a two-phase research strategy for a subsequent initiative, now known as the AMPLIFY Project.

In the first research phase, the team investigated the experiences and needs of EIF at HSIs through a case study method. This served as the foundation for the structure (PLAN) of the AMPLIFY Institute, which was then implemented (ACT) in the Fall of 2022. After the initial implementation, effectiveness was evaluated (OBSERVE), and possible improvements were identified (REFLECT). A nationwide survey will be used in the second research phase, which is currently in planning, to examine the needs and experiences of EIF at HSIs. This will help redesign the AMPLIFY Institute (PLAN) and implement the updated model (ACT). The model's performance will be evaluated (OBSERVE), and the results will be presented at a national AMPLIFY Institute conference.

To achieve this, the research team designed a series of *Personas*, based on insights gathered as part of a multiple case study research. *Personas* are fictional characters created to represent a specific group of users, in this case, EIF. Six *Personas* were constructed from research data to represent EIF participants, demonstrating backgrounds and personalities, their teaching goals, leadership competencies, change efforts, frustrations, and professional development needs and desires [11].

Analysis of these *Personas* informed the design and implementation of the first AMPLIFY Institute Kickoff. The first iteration of the AMPLIFY Institute included fourteen EIF from public and private higher education institutions in Florida. During the Kickoff, the EIF shared contributions their students provide to their teaching objectives, values they promote in their classrooms, communication strengths they bring to classrooms, resources that support their work in classes, and dreams that motivate them, among others. The next section will summarize the design of the AMPLIFY Institute and the project's progress towards its intended outcomes.

Designing the AMPLIFY Institute

As previously noted, the design of the AMPLIFY Institute was informed by the PLAN phase of the action research cycle, specifically by the case study research. A total of seventeen EIFs from six HSIs across two regions of the United States participated in this initial study. The participants sample included a diverse set of EIF perspectives; there was representation in years of experience, institution types, engineering disciplines, ethnicities, and gender identities. Each participant in the study represented a single case [12]. The EIF participated in one or more 45-60 minutes semi-structured interviews that included guiding questions to maintain consistency.

For the analysis, the interviews were audio-recorded, transcribed, de-identified, and coded using a constant comparison analysis approach [13]. This analysis included an inductive approach, during which codes and themes were created based on an EIF's own words [12] [13], and a deductive approach that leveraged design thinking, engineering and educational leadership, and agency theoretical frameworks [14]. The results of the case study were consolidated into six *Personas* profiles that reflected the biographies, personalities, goals, frustrations, competencies, and needs of the participants EIFs. *Personas* are composite "characters" that have been used in design and ethnographic research to communicate the complexity and diversity within rich data sets, while also supporting confidentiality [11]. *Persona*s development allows designers to

maintain a focus on the user population throughout the design process, while ethnographers have leveraged *Personas* to create archetypes from fieldwork data [11] [15]. The AMPLIFY Institute design was influenced by the *Personas* derived from this multiple-case study.

As an example, one of the *Personas* profiles is Committed Martha, a Hispanic instructional faculty, whose personality can be described as outgoing, determined, passionate, optimistic, and energetic. She has been teaching for 3 years as an assistant professor of practice, so she is actively looking for pedagogy-related professional development to improve her teaching skills. She is passionate about female empowerment in computer science, and therefore she is advisor of *Girls Who Code*. Committed Martha's goals are, among others, to encourage female representation in Technology, help bridge the gap between theory and industry, and become a better instructor to better serve her students. Regarding frustrations, Martha expresses struggles with support for resources (funding for professional development) and time constraints for active involvement in students' organizations. In thinking about the design of the AMPLIFY Institute, Martha's persona was important for considering the types of resources needed for EIF participants, as well as, how the AMPLIFY Institute would support EIF with diverse educational change goals. As an example, each EIF was provided with a large stipend for their participation. Given the significant number of pedagogy-related professional development, we wanted to provide tools and frameworks for EIF like Martha, who want to think about female representation and support for students outside the classroom (e.g., student organizations).

A second example of a *Personas* profile is Caring Donald, a senior Instructional faculty member at a 4-year private university. He started in academia after an early retirement from industry. Donald has extensive experience and reminds students that problems in real life are not the same as in the classroom, that they need to "think outside the box". Donald compares the current leadership of his department to his previous experiences in industry and feels frustrated with the bureaucracy of higher education. His personality identifies him as knowledgeable, mentor, headstrong, caring, and reliable. Donald's extensive years in teaching have earned him departmental recognition, however, he wishes he could share his wealth of knowledge with younger professors. Donald's agency towards educational change is affected by his perspectives, age and lack of enthusiasm to innovate. Students' lack of preparation for class, and bureaucracy struggles (e.g., not getting budget for senior design projects, paperwork taking too long to process, etc.) are Donald's frustrations. For the AMPLIFY Institute, Donald's persona was critical in thinking about how to celebrate and leverage the wealth of knowledge of the EIF, both from their teaching experience and all prior professional experience. The use of group coaching as part of the AMPLIFY Institute design (both in the Kick-Off and the actual coaching sessions) enables the EIF to support and celebrate each other, as opposed to models where the program facilitators are the experts.

Overall, the *Personas* demonstrated that EIF backgrounds are diverse, representing the nuances of valuable teaching profiles worthy of deeper research, in which more faculty can express their goals, frustrations, and contributions to the successful learning and career paths of students at HSIs. This diversity was one of the main reasons to design the framework of the AMPLIFY Institute previously described.

A design framework emerged through the case-study research of EIF and mapping existing scholarship of educational development. We discovered various findings about why EIFs work towards professional development and better support their students at HSIs. From our literature reviews, we found several faculty development programs, resources and decisions that were made to support STEM faculty, or non-tenure faculty, but not necessarily in the context of HSIs. We therefore needed to look closely at the decisions made to design any faculty development for EIFs – and took a systems approach to consider how these decisions impact them.

AMPLIFY Institute - First Iteration Design

The Kickoff of the AMPLIFY Institute was conducted in Florida through a two-day coaching style workshop. A total of fourteen EIF representing four Florida HSIs participated in the Kickoff. Day one was the "Inspiration Day", when EIF had the opportunity to work on handouts in groups of three or four, analyzing and reflecting about questions such as 1) *How would you reimagine engineering education at your HSI? 2) Who are your students? 3) What does it mean to be at an HSI? 4) Who are engineering instructional faculty at HSIs? and 5) What now? What's next?*.

Day two was the "Ideation Day". With the same dynamics, working with different peers as day one, EIF built on ideas to answer the following prompts: *1) What impacts agency towards educational change?, 2) What is your leadership identity?, 3) What is your mission towards a change effort?, 5) What are your available moves?, and 6) What now? What's next?,* opening the path to the coaching sessions, which were held in the following two months.

One of the central components of the final AMPLIFY Institute design were individual change projects developed by the participants during the AMPLIFY Institute. The EIF worked on these projects during the coaching sessions following the Kick-Off. At this inaugural AMPLIFY Institute, the change projects were diverse and included the following:

1) Redesigning of existing courses.
2) Fostering industry partnership in construction of curriculum.
3) Coaching two-years college students on their applications to four-years programs.
4) Converting students' diverse math backgrounds to assets in mechanical engineering courses.
5) Promoting multidisciplinary teams in the curricula across different departments.
6) Encouraging awareness of national security problems at the high school level.
7) Redesigning engineering project management classes.

In the semester following the AMPLIFY Institute, the celebration of the Florida AMPLIFY Institute allowed the recognition of these inaugural AMPLIFY Institute fellows, where each participant accumulated 25 hours of workshop and coaching hours relating to their project towards educational change. At the celebration, each participant EIF reflected on the progress of their projects, the aspects most impacting their professional development, and how coaching supported in their projects' success. In addition, the AMPLIFY Project offered to provide the

participant EIFs the opportunity to apply for a travel award to the American Society for Engineering Education Annual Conference or National Effective Teaching Institute for Spring/Summer 2023 to continue their professional development.

Looking Ahead: Evaluation and Re-Design

Following this first iteration of the AMPLIFY Institute design, we are between the ACT-OBSERVE-REFLECT phases of the first action research cycle. The next steps are focused on conducting a similar AMPLIFY Institute with EIFs at Texas HSIs in the fall of 2023. Prior to this next iteration, we will be completing our evaluation of the AMPLIFY Institute outcomes for the Florida Institute (AMPLIFY Institute that was held in Florida in September 2022). This evaluation includes analysis of Kickoff artifacts (i.e., workshop handouts, observation notes), coaching sessions and pre/post-surveys. The results of this evaluation will be disseminated and will directly affect the design of the Texas Institute (AMPLIFY Institute to be held in Texas around Fall 2023).

Concurrently, we will be preparing to start the second action research cycle. The pre/post-surveys from the Florida Institute served as an initial pilot for a national survey that will serve as one of the core components of the PLAN phase of the second action research cycle. Combining the results of this survey with the evaluation of the Florida and Texas Institutes, we will conduct another round of Florida and Texas Institutes that will be open to EIF participants from across the country. In this second round, AMPLIFY fellows will train and serve as Kickoff facilitators and coaches, beginning to build toward the self-sustaining model of the AMPLIFY Institute. Finally, in the last year of the project, we will hold a national conference to provide opportunities for EIF to celebrate their development and share the results of their educational leadership with scholars, other EIF, and administrators.

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