1-1-2022

Chapter 12: A Shared Vision for Online Teaching Effectiveness of K-12 STEAM Minority Teachers

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Recommended Citation

El-Amin, A. & Austin, S.J. (2022). " A Shared Vision for Online Teaching Effectiveness of K-12 STEAM Minority Teachers" In Implementing Diversity, Equity, Inclusion, and Belonging Management in Organizational Change Initiatives, 216-233. Abeni El-Amin, ed. IGI Global. 10.4018/978-1-6684-4023-0.ch012

Implementing Diversity, Equity, Inclusion, and Belonging Management in Organizational Change Initiatives

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A volume in the Advances in Human Resources Management and Organizational Development (AHRMOD) Book Series

IGI Global
PUBLISHER of TIMELY KNOWLEDGE

Published in the United States of America by
IGI Global
Business Science Reference (an imprint of IGI Global)
701 E. Chocolate Avenue
Hershey PA, USA 17033
Tel: 717-533-8845
Fax: 717-533-8661
E-mail: cust@igi-global.com
Web site: http://www.igi-global.com

Library of Congress Cataloging-in-Publication Data

Names: El-Amin, Abeni, 1974- editor.
Title: Implementing diversity, equity, inclusion, and belonging management in organizational change initiatives / Abeni El-Amin, editor.
Description: Hershey, PA : Business Science Reference, 2022. | Includes bibliographical references and index.
Identifiers: LCCN 2022063144 (print) | LCCN 2022063145 (ebook) | ISBN 9781668440254 (ebook) | ISBN 9781668440230 (hardcover) | ISBN 9781668440247 (paperback)
Subjects: LCSH: Organizational change. | Diversity in the workplace--Management. | Leadership. | Organizational effectiveness.
Classification: LCC HD58.8 (ebook) | LCC HD58.8 .I467 2022 (print) | DDC 658.4/06 23/eng/20220--dc03
LC record available at https://lccn.loc.gov/2022063144

This book is published in the IGI Global book series Advances in Human Resources Management and Organizational Development (AHRMOD) (ISSN: 2327-3372; eISSN: 2327-3380)

British Cataloguing in Publication Data
A Cataloguing in Publication record for this book is available from the British Library.

Chapter 12
A Shared Vision for Online Teaching Effectiveness of K–12 STEAM Minority Teachers

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ABSTRACT

This chapter presents a model to improve the online teaching effectiveness of K-12 science, technology, engineering, arts, and mathematics (STEAM) educators who teach underrepresented minority (URM) students. Further, K-12 institutions must consider the imperative by creating a STEAM professional advocacy network (SPAN) through which the online teaching effectiveness of K-12 STEAM teachers is improved. Ultimately, SPAN seeks to broaden the participation of URM students in STEAM from high-need, racially diverse learning environments nationwide. There is an initiated three-phase process through SPAN that begins with a pre-launch phase to convene an advisory board. The three phases of SPAN are program implementation, convene, and refinement. Educational leaders are accountable for the well-being of teachers and student achievement, and this model adapts to continuous improvement efforts for K-12 organizations.

INTRODUCTION

Health officials describe a pandemic as an epidemic covering a large area and affecting a large population (Morens et al., 2009). The World Health Organization declared a global pandemic in the past few years (Cucinotta & Vanelli, 2020). As a result, in Spring 2020, online teaching became the norm, and thus effective teaching practices required an enhancement. School districts were forced to utilize online

DOI: 10.4018/978-1-6684-4023-0.ch012

learning to avoid exposure to the disease (Cauchemez, 2009). In addition, teachers need to be supported to be effective during unpredictable circumstances (Beteille, Ding, Molina, Pushparatnam, & Wilichowski, 2020; Strong, 2018). However, school districts throughout the United States lack the resources for pedagogical opportunities for STEM teachers (110Kin10, 2020). Prior to the current pandemic, STEM teachers assisted URM students in gap areas (Johnson Austin, 2019; Theobald et al., 2020; Olszewski-Kubilius, Steenbergen-Hu, Thomason, & Rosen, 2017).

Consequently, the pandemic has created additional challenges. The lack of student and teacher access to technology, modifications of instructional processes in the classroom, and decreased student engagement heighten the need to bridge the 'digital divide' (Beteille et al., 2020; Ferdig et al., 2020). Min (2017) defines the 'digital divide' as the technological inequalities between the rich and the poor, the educated and uneducated, and Blacks and Whites. Banks (2006) argued that the 'digital divide' is a metonym for African Americans' experiences with access to technology. A study by Hung et al. (2019) confirmed that racial inequality was one of the reasons for the achievement gap between African American and White students. G. Ladson Billings (2006) explored the need to examine why the achievement gap exists. Low socioeconomic students are denied access to a quality education because of the disparities in school districts where resources are lacking (Gladson Billings, 2013). The achievement gap for African American students widened during the COVID-19. School districts across the United States reported that African American students have fallen behind the most during the coronavirus pandemic (Kuhfeld et al., 2020).

Furthermore, the 'digital divide' created a situation where students face undue barriers to performance in the classroom and is exacerbated when STEAM teachers do not have appropriate support to meet the needs of URM students. Therefore, SPAN introduces a model for STEAM educators to improve their online teaching effectiveness. Models are instrumental in defining the qualities of effective teaching (Sanchez-Cabrero, Estrada-Chichon, Abad-Mancheno, & Manoso-Pacheco, 2021).

BACKGROUND

The Historical Context

Educational administrators must use a diversity, equity, inclusion, and belonging lens when examining the inclusivity of teachers that instruct URMs (El-Amin, 2022). Belonging is described as feeling valued or committed to a group (Dortch & Patel, 2017). Thus, various thrusts are needed to provide innovative programming and leadership. Above all, to realize equity gains, leaders should encourage various methods where teachers can acquire support from those of the same race, class, sex, ability, and sexuality or intersectionality. Indeed, this perspective is currently a conventional notion, yet when weighed with reality, teachers who instruct URMs face many challenges with personal well-being, resources, and instructional technology when teaching in the online environment. As a result, there are fluctuating and regularly pretentious social and professional barriers instead of perspicuous opportunities. Hence, examining teachers and leadership is a unique connection as teachers must rely on intrinsic motivation and genuine programming developed for this population to thrive in this environment. In any case, given the social elements of discrimination in Western instructive contexts, minority teachers have innumerable issues executing online training when working with URMs.

Culturally Relevant STEM Pedagogy

Culturally relevant pedagogy (CRP), as conceptualized by G. Ladson Billings, examines how students use culture to create meaning and understand the world they live in (Milner VI, 2001). The primary focus of teachers' adoption of CRP is building and transferring knowledge. However, this classroom asset allows students to question inequity and fight against many isms and phobias they encounter with an organization.

Mensah (2011a) notes that the traditional methods for preparing educators in STEAM-related fields such as science are not overtly culturally relevant for students of color. Frequently, scientific culture is rooted in positivist thinking (Mensah & Jackson, 2018). As a result, restricts the Western conception of knowledge. Also, from a pedagogical view, learning environments are absent of various perspectives since learning environments are typically teacher-centered and lecture-based (Mensah & Jackson, 2018). Furthermore, the overrepresentation of White middle-class male scientists reflects a culture of power resulting in a lack of representation of scientists of color (Barton & Yang, 2000). Unfortunately, science was not taught in many urban elementary schools, and the subject was taught by educators who believed science was not necessary. These same educators lacked sufficient knowledge of science content and experienced limited professional development in the subject. Therefore, researchers find critical race theory (CRT) as the mechanism for transforming science teacher education, especially when training pre-service teachers on serving the needs of all students. CRT is known for seeing race, racism, and power as the key to understanding inequalities in education. CRT can provide a deeper understanding and analysis in science teacher education

When students engage in STEAM-related fields as a potential career, their efforts improve access and demonstrate elements of critical race theory in action (Throne et al., 2022). Achievement in STEAM careers is accomplished by incorporating culturally relevant curriculum as part of the instruction, implementing engaging pedagogy, delivering deliberate curriculum, and framing curriculum to transform teacher education. The dominant perspective of what science is, who it is for, and how science is taught is challenged (Gunning & Mensah, 2010). As a result, the notion of science as only for others and not for them is redirected (Mensah & Jackson, 2018).

STEAM Teaching Effectiveness

The problem related to teaching effectiveness includes the failure of institutions to identify process improvements to ascertain appropriate stakeholders to accomplish educational goals and implement streamlined classroom processes to ensure STEAM teachers have the appropriate professional support needed to instruct URM students. This problem poses an essential challenge because educational institutions currently provide training for the workforce of 2030.

Furthermore, the problem related to educational, teaching effectiveness includes failure of institutions to identify process improvements, ascertain appropriate stakeholders to accomplish educational goals, and implement streamlined classroom processes to ensure STEAM teachers have the appropriate professional support needed to instruct URM students in the technological improvements (Abubakar et al., 2019).

Current performance measures of STEAM programs illuminate issues in processes within instruction, the quantity of STEAM teachers in the classroom, professional support networks, and STEAM programming, which needs improvement, yet is not being addressed in educational environments (Lu et

al., 2017; Muda et al., 2017). STEAM performance measurement factors that impact long-term institutional effectiveness remain mostly unknown within educational institutions (Pearson, 2017).

Challenges Teachers Face Implementing STEAM Curriculum

Mamlok-Naaman (2017) states that STEM teachers play a vital role when it comes to implementing curricula. More importantly, educators who understand the fidelity of the curricula According to the National Commission on Teaching and America's Future (1996), one teacher working in isolation is less preferred when trying to establish an ecosystem of teachers with key characteristics. The ecosystem of secondary and post-secondary education teachers creates a model for the infrastructure for purposeful instruction in science, technology, engineering, and mathematics instruction that researchers believe increases student engagement (Kennedy & Odell, 2014). Furthermore, well-educated STEM teachers raise the next generation of STEM professionals (Corlu et al., 2014). As mentioned previously, teachers can shape students' interest in STEM (Kennedy & Odell, 2014).

Regarding teacher effectiveness, teachers are a critical component of curriculum implementation. However, there is a shift from what teachers know and think to what they do, according to Chestnut (2017). The basis for teacher effectiveness dwells at the intersection of student achievement performance ratings from peers, administrators, and key stakeholders. This is a clear indication of how educators are important in implementing STEM curricula. Holstein and Keene (2013) further explore the importance of curricular effectiveness.

Additionally, The National Academy of Engineering reported the difficulty of ensuring usefulness relating to effective implementation (Guzey et al., 2016). Because of teachers' challenges when implementing curricula, professional development is often a viable resource. Takahashi (2014) acknowledged the impact of professional development on teachers when implementing curricula through a research study. Further examination revealed that a collaborative approach to implementing curricula should involve how students learn to improve teaching. The school-based learning approach proved to be an effective way to implement curricula.

COLLABORATIVE DIVERSITY AND INCLUSION PROGRAMMING

Science Technology Engineering, Arts and Mathematics (STEAM) careers are more important now than ever (Van Dijk, 2017). Technology impacts teaching effectiveness at all levels of the educational system (Nicola et al., 2020). Notwithstanding, technological challenges can leave teachers unprepared for online learning, especially in high-need schools (Beteille et al., 2020). Access to technology, classroom process modification, and engagement highlights the need to bridge the digital divide (Beteille et al., 2020; Van Dijk, 2017). In addition, many school systems house youth who represent poorly resourced environments with limited access to the internet. Furthermore, teachers need support to be effective during unpredictable circumstances (Beteille et al., 2020; Strong, 2018).

Figure 1. NSF INCLUDES Five Design Elements of Collaborative Infrastructure. Created by, and intellectual property of, the NSF INCLUDES Coordination Hub

COLLABORATIVE STRUCTURES FOR A SHARED VISION

A collaborative infrastructure is a basis for the five National Science Foundation Inclusion Across the Nation of Communities of Learners of Underrepresented Discovers in Engineering and Science (INCLUDES) design elements. Figure 1 depicts the five design elements, which are: (1) shared vision; (2) partnerships; (3) goals and metrics; (4) leadership and communication; and (5) expansion sustainability and scale.

As such, the key enabling ideas, intellectual approach, and qualifications are described in the timeline in **Table 1** to carry out the activities for implementing SPAN. The focus is on developing a shared vision through three distinct phases of work. **Figure 2** is a logic model for the advisory board to review as a starting point. Potential topics considered for the shared vision include teacher quality and effectiveness, support services, information technology services, continuous improvement, and resources to strengthen teacher performance, effects of technological improvements on teaching, and adaptations made—professionally and personally. Such topics of necessity are considered within the broader context and realities of educational initiatives, performance expectations, and teachers' explicit or implicit understanding of broadening participation in STEAM fields.

Theory of Change Framework

A three-phase process begins with convening an advisory board to identify a theory of change (ToC) framework that guides the three implementation phases through SPAN. Designated as the **pre-launch phase**, the advisory board produces a framework that serves as the overall scaffold for the program and aligns with the principles embedded in the INCLUDES shared vision. The iterative process for using the ToC framework involves understanding and refining the intervention and anticipated outcomes (Davenport et al., 2020).

In Phase 1 - Program Design, the objective is to conduct a comparative mixed methods program of 100 STEAM teachers from elementary, middle, and high schools in a local school district and up to 50

Table 1. Timeline of activities

Task	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Pre-Launch Phase												
Convene Advisory Board to Develop Theory of Change												
Phase 1 Program Design												
Determine Sample Size												
Develop Instruments												
Data Collection												
Data Analysis												
Phase 2 Convene												
Develop Convening Agenda												
Develop Convening Evaluation												
Prepare Report												
Phase 3 Refine												
Convene Advisory Board												
Analyze and Refine Logic Model												
Compile promising Practices												
Phase 3 Refine												
Technical Input/Feedback												

community partners. Evidence-based data on K-12 online teaching effectiveness from engaged STEAM teachers and key community stakeholders are assembled.

In Phase 2 - Convene, the objective is to convene up to 100 STEAM teachers and 50 community partners at a one-day convening held to disseminate findings from the program. Phase 3 Refine - The objective is to revisit, refine, and finalize the initial theory-based framework, produced during pre-launch, based on the insights and knowledge gained during Phases 1 and 2 as a foundation to develop and advance a shared vision regarding online teaching effectiveness.

The three phases, **Program Design, Convene,** and **Refine**, follow the pre-launch phase, as described below.

Phase 1 – Program Design

The program aligns with collaborative curriculum design to construct enhanced student-centric online environments. There are three basic types of curriculum design: subject-centered design, learner-centered design, and problem-centered design (Vass, 2020). The preferred method is a combination of each curriculum design approach based on collaborative curriculum design. Collaborative curriculum design is an invaluable tool to gain knowledge and expertise from other educators when developing a curriculum (Kuo & Fitzpatrick, 2020). Often teachers may develop their courses or receive a course shell to facilitate teaching and learning. The collaborative strategies utilized to support developing curriculum are based on developing the overall course outline to map content to learning goals, encompassing how to develop a course plan and build the course. All learning goals must describe assessment strategies, assignments, course content, expert analysis, and immersive activities (Kuo & Fitzpatrick, 2020).

Phase 2 – Convene

SPAN's in-person convening is offered at no cost to at least 100 STEAM teachers and 50 community stakeholders. In summer, the one-day convening occurs at a teaching hub for collaboration among

Figure 2. Theory of change logic model for advisory board to review and consider

Mission: STEAM Professional Advocacy Network (SPAN) – A Shared Vision for Online Teaching Effectiveness of K-12 STEM Teachers
Problem Statement: A pandemic like COVID-19 has created challenges with URM students and teacher access to technology, classroom process modification, and engagement.

Target Population	Theory of Change	Strategies/ Activities	Outputs	Outcomes	Impact
Primary Goal: Create SPAN to enhance PD opportunities for STEM teachers during a pandemic --- **Secondary Goals**: • Encourage educational leaders and teacher participation in support activities of SPAN • Focus on the explicit needs of teaching URM students during a pandemic • Develop culturally relevant strategies	When STEAM teachers engage in PD initiatives with integrated support systems, then they are more likely to: • Become more engaged in the objectives and goals of the program • Feel valued and appreciated as creative members in the educational profession • When using integrated support mechanisms, teachers increase their ability to meet the diverse learning needs of their students	• Foster collaborative relationships between educational leaders and STEAM teachers. • Recruit participants to take part in the SPAN activities, meetings, and convenings • Develop Virtual Convening • Develop In-Person Convening • Convene In-Person Convening • Enhance existing relationships to support meaningful learning by participants • Highlight participant successes with the educational community; promoting program success rates and individual achievement	• In-person Convening of least 100 STEAM Teachers • 50 Community Stakeholders	As a result of participating in SPAN participants will: • Support STEAM teachers adapting to classroom Instruction during a pandemic • Improve the barriers of teaching STEAM to URM students during a pandemic • Improve health and well-being of STEAM teachers during a pandemic • Determine promising practices to connect the broader community to culturally relevant STEAM pedagogy	• Feel valued and appreciated as creative members Increased STEAM teacher relationships in the profession • STEAM teachers who are confident about using support system integration for self-care • Greater organizational and educational leadership commitment where STEAM teacher needs are met; where all teachers feel belonging • Culturally relevant strategies are implemented • Improvement of STEAM teacher effectiveness with the support of educational leaders that mitigate barriers in the classroom

teachers, district administrators, and stakeholders, 100 STEAM teachers, and 50 community stakeholders. Potential topics considered for the shared vision include teacher quality and effectiveness, support services, information technology services (3-D), continuous improvement and resources to strengthen teacher performance, effects of technological improvements on teaching, and adaptations made, professionally and personally. Another round of meetings occurs in this phase to support disseminating data as the promising practices guide. Also, invitations are extended to the local press to cover a story on community partnerships.

Phase 3 – Refine

The objective is to revisit, refine and finalize the initial theory-based framework, produced during prelaunch, based on the insights and knowledge gained during Phases 1 and 2 as the foundation to develop and advance a shared vision regarding online teaching effectiveness. In phase 3, reconvening the advisory

board members is necessary to finalize and authenticate the shared vision. Ideally, a summary report is shared with the community of stakeholders.

ANTICIPATED OUTCOMES

The overall expected outcomes, including impacts from the collaborative focus, are indicated in the logic model that follows. Outcomes for STEAM teachers teaching URM students include: supporting STEAM teachers adapting to classroom instruction during a technological improvement; improving the barriers of teaching STEAM to URM students in a technological improvement; improving the health and well-being of STEAM teachers, connecting the broader community to culturally relevant STEAM pedagogy; and increasing teacher awareness of their role and impact of broadening participation in STEAM fields for workforce 2030. Anticipated outcomes will lead to increased STEAM teacher relationships in the profession, STEAM teachers who are confident about using support system integration for self-care, greater organizational and educational leadership commitment where STEAM teachers' needs are met; where all teachers feel belonging, culturally relevant strategy implementation, improvement of STEAM teacher effectiveness with the support of educational leaders that prioritize mitigation of barriers in the classroom, and impacts where educational leaders support STEAM teachers in ways that focus on their explicit needs and budget resources to alleviate challenges.

LEADING K-12 EDUCATIONAL PROGRAMMING

Effective teacher develops instructive educational leadership (Halverson & Sheridan, 2014). In addition, teacher effectiveness is demarcated by differentiation from conventional leadership tactics that present a variety of educational philosophies used to demonstrate program effectiveness (Avolio et al., 2018). Also, there has been a general move in progressive economies on engaging students, obtaining awards, and gaining funders to manage information and improvement processes (Buys & Bursnall, 2007). Globally, admittance to K-12 educational programs has increased dramatically. Development is changing the way that individuals characterize social organizations. Centralized leadership, data sharing, participation, and progression are more common than earlier (Little & Rentsch, 2011). Online applications have supplanted computerization. Accomplishment lies in the ability to bestow, offer, and use data to moderately complex issues; to change and improve thinking about new prerequisites and achieve positive outcomes; to marshal and extend advancement to usher new leadership strategies (Halverson & Sheridan, 2014).

Educational Leadership and Administration Theory: Distributed Leadership

One of the fundamental aspects of leadership is effective communication and knowing how to function admirably with individuals. Institutional and instructive leaders that see how to encourage effective communication and cooperation will function admirably with staff, workforce, students, givers, and different partners (Kuo, 2009). Hence, executing change management rapidly and easily into superior execution mode requires leaders who present group objectives, recognize program objectives, dedicate qualified individuals to assignments, program, evaluation, and characterize group conduct guidelines to

guarantee that colleagues cooperate, so targets are met (Rajbhandari, 2016). Therefore, in this example, leaders execute distributed leadership.

Distributed leadership provides a unit of investigation in the analysis of leadership (Gronn, 2002). As an option in contrast to the current emphasis, which may fixate on individual leaders' activities and suggests distributed leadership. For example, articulated standards of leadership experienced cause nuisance in the division of work for working environments, especially when various arrangements of relationships, which may be concentrated entirely on distributed practice. These interconnected activities characterize the basis of stakeholder relationships when developing student programming. These methods establish a systematic categorization of distributed leadership (Gronn, 2002).

Effective Communication and Collaboration

Effective leaders must establish a framework for effective groups by deliberately making a culture of coordinated effort. Effective methods include putting forth group objectives, allotting jobs to individual colleagues, and characterizing explicit rules that outline how colleagues should capacity to limit struggle and enhance group execution. Leaders who esteem a cooperative culture should pay attention to comprehend, permit each voice to be heard, partake inlay level as well as high-level worries, look for unity (not detachment), differ without being unpleasant, share an extraordinary viewpoint, talk genuinely, remain open to better approaches for getting things done, be positive, be non-critical, and open to novel reflections from subordinates. Drawing individuals into the process requires assigning frameworks, techniques, practices, and projects which include all teachers as dynamic members in consistent improvement exercises. Teacher contribution requires establishing and keeping a climate that cultivates a "feeling of pride." Executing development programs are a method for working on institutional problems.

Further, administrators should empower teachers to distinguish improvement opportunities, make ideas, and carry out those ideas to expand work effectiveness and productivity in their working environment. Institutional-wide development program benefits are that it expands representative contribution, responsibility, and proprietorship; inspires teachers through acknowledgment and honor; further develops well-being, quality, responsiveness, and cost through the decrease of waste; encourages a ceaseless improvement culture; builds employer stability through a responsive, committed labor force; compensates and acknowledges top performers (Clugston & Calder, 1999).

Qualified and adroit leaders comprehend the significance of perceiving positive conduct, practice, and exercises (Kezar, 2005). Accordingly, the people who flourish in amazing leadership practices are true and guarantee that acknowledgment comes from the heart. They are fair and reliable while guaranteeing a uniform way to deal with individual acknowledgment. They perceive individuals when they accomplish, not months or years after (Clugston & Calder, 1999). Exceptional leaders model the way by providing acknowledgment to develop the internal culture and engagement. Exceptional leaders are adaptable concerning the time, spot, and acknowledgment. The utilization of acknowledgment is fitting to support teachers. Most importantly, leaders should adjust acknowledgment to the organization's objectives and goals. The general goal is to energize leadership practices that establish a climate that cultivates communication and execution at all levels of the organization.

Teachers as Entrepreneurs

K-12 activity and advancement are an effect of deliberate business improvement in post-optional instructive institutions (Newbold, 2014). An assessment of groundbreaking, multi-faceted leadership that enables teachers to be progressively innovative, take risks, and show proactive leadership is required in the 21st century (Morris et al., 2014). In addition, the key conjecture of this conceptualization should be examined along with support behind the improvement of authoritative effectiveness across K-12 institutions. Subsequently, Morris et al. (2014) verified that five components of the institutional-wide business are expected to accomplish proactive leadership in colleges. Interdisciplinary examination, educational plan programs, co-curricular programming, community commitment, and institutional activities advance STEAM programming (Halverson & Sheridan, 2014). An integrative model of these key components adds to an environment where effective institutional-wide projects are accomplished.

Teachers as Program Managers

STEAM program management requires understanding limitations, which alludes to how each program is managed related to its scope, program length of time, and limited monetary assets accessible or cost (Larson & Dark, 2015). Brewer and Dittman (2013) indicated that the scope, time, and cost of programs and program management are assessed based upon the objectives of a STEAM program for educational curriculum or grant funding. Moreover, the oversight of programs and their program managers is vital. Moreover, quality is a significant part not demonstrated as a component of the triple quality management imperative, yet regardless a significant element to a program's success. Teachers should adjust programs by making compromises to focus on finishing a modified objective on time and inside budgetary constraints (McCaffery, 2018).

Finally, teachers must anticipate that internal stakeholders will assume liability for assigned programs based on larger student support and development plan (Avilova et al., 2015). Effective programs occur when appropriately trained staff are recruited or assigned to programs. Teacher onboarding efforts should appropriately admit new teachers into organizations. Leaders should urge staff to embrace student support and developmental programming to advance educational plans while also providing preparation so teachers can further develop proficiency and professional development (Eckel & Kezar, 2003). In this vein, numerous teachers and colleagues might require assistance to develop better program management leaders; subsequently, teachers should characterize needs for institutional-wide efforts and projects, work consistently with all partners, and assume extreme liability for programs of a foundation or school. Further, supporting teachers to effectively show expertise through data-sharing and knowledge conveyance in their subject matter is vital to motivate teachers effectively.

Leadership and Teacher Effectiveness

This section includes an analysis of leadership effectiveness in offering help to teachers working with UMRs. Regardless, teacher effectiveness is made, changed, and supported over the long haul (Lester, 2009). For example, teaching the board is the most pertinent administration and advancement application for instructive improvement. The direction of institutional cycles directs the program improvement. Besides, work environment improvement is vital to labor force advancement. Further, using the educational system propels program successes (Lester, 2009). Development through teacher support structures drives

motivation and supports program development. Moreover, Blumenfeld et al. (1991) verified that haptic and experiential improvement is the best strategy for guidance to assist with guiding students exploring technology. Empowering people to learn through innovation practices empowers teachers and students alike. Further, effective preparation and educational programs engage students.

Experiential advancement procedures should be considered to create instructive improvements (Daniëls et al., 2019). Teacher effectiveness benefits are that it varies from conventional advancement philosophies. For example, teacher and facilitator effectiveness regarding instructive practices suggests effectiveness of a STEAM program. Thus, instructive organization improvement philosophies offer significant advancement procedures to guide existing and future leaders. While improvement procedures are an additional aspect of making connections with leadership, one should assess the meaning of various advancement approaches in the instructive organization. Teacher effectiveness can have unintended consequences (Chau & Cheng, 2010). While many analyses confirm the successes of teacher effectiveness programs in various regions, the full use after an improvement program in other regions is not always as positive (Steiner et al., 2007). For instance, the choice of improvement in instructive organizations indicates some sufficiency in developing a teacher's capacities.

Additional jobs of educational leaders are to help institutional partners acknowledge teachers' abilities to connect with students in innovative and engaging ways. In addition, educational leadership should urge teachers to use optional and versatile instructional methods, which is profoundly important with various learning styles (White, 2018). While advancement can enable teachers and teachers, versatile educational methods should be maintained through deliberate work, including those of conventional and forward-thinking students (Kasworm et al., 2010). For instance, monetary, cultural, and social changes experienced by teachers working with URMs are important to the work (Dyer & Dyer, 2017). The capacities and abilities of teachers can immediately become outdated, and consequently, teachers should reliably prepare to maintain pace with global competition. Traditional leadership models both inside and outside of K-12 establishments have become capricious with such instructive organizational strategies. The job of leadership in K-12 organizations prescribes permanency and creates leadership abilities in teachers while at the same time providing assessment measurements, which exhibit improvement gains (Manuti et al., 2015).

Educational leadership practices in K-12 institutions and general improvement conditions are the standard (Benneworth et al., 2017). Organizational improvement highlights the general mission of institutions. Given the circumstances, innovative practices point towards creating STEAM programming with valuable and epistemologically sound practices. Moreover, Halverson and Sheridan (2014) depicted the hidden underpinnings of improving formal teacher effectiveness methods (Halverson & Sheridan, 2014). Also, administrative execution through institutional or authoritative leadership practices and strategic data is necessary to drive institutional human resource capacities. Likewise, human resource approaches improve teacher effectiveness advancement. The leadership of teachers promotes the capacity to develop human resource capacity further. Leadership advancement adds to the reinforcement of educational innovation; in this manner, STEAM programs must use instructive expertise and organization proficiency to develop. These discoveries are especially important for leaders, human resource managers, and student advancement (Kuo, 2011).

To extend the perception of the educational organization as an enterprising entity, there must be an accentuation on capabilities among formal and facilitated strategies (Cai et al., 2019). Likewise, the results demonstrate connections between the expertise used by organizations. Teacher effectiveness provides logical reasoning for formal and facilitated program development procedures. When choosing

teachers, employing boards of trustees should analyze a dependence on conventional procedures, as progress results exhibit formal and informal leadership methods to connect with institutions' stakeholders (Kock & Ellström, 2011).

Indeed, K-12 teachers and professionals work in a global climate (Nadtochy et al., 2016). The capacity to differentiate STEAM programs within K-12 institutions is specific. Therefore, teachers need to benchmark from other school areas to develop, execute, and sustain STEAM programming. Certainly, K-12 establishments should offer important help for students and teachers. The goal of educational leadership is to coordinate vital administrative work predicated on teachers and URMs.

Further, leaders should decide the impact of municipal and global concerns in course development; ponder how assumptions for instructive experts vary; determine how instructive experts obtain noteworthy instructive results; dissect communication procedures to develop cooperation further, advance collaboration, foster connections in today's climate; and investigate the utilization of computerized devices to work with the combination of specific aptitudes within programs (Nadtochy et al., 2016). Irrevocably, leaders should strategically react to issues with individual morals and values experienced in a complicated and interconnected workplace. Also, STEAM teachers are obligated to be socially mindful, aware of STEAM program requirements, and considerate to stakeholders who may experience the ill effects of unfavorable impacts of social determinants. Embracing social responsibility is a critical core value to balance inequities in the system. Social responsibility implies that education organizations are expected to work on teachers' and students' professional development. As a result, the educational complex guides instructive practice to advance the instruction of STEAM programming, stakeholder collaboration, advance cooperation, and foster connections in a global climate.

Convincingly, to resolve the impact of government and worldwide contemplations in educational leadership, leaders must prepare STEAM teachers and students who are socially responsible and inspired to innovate in the communities they serve (Buys & Bursnall, 2007). For example, service-learning (SL) has been utilized to demonstrate the social aspects of instruction and foster students' professionalism in the field (Mc Menamin et al., 2014). Delineated to determine the effectiveness of SL, six areas of potential SL impacts are (i) individual and relational instances; (ii) understanding and applying information; (iii) commitment, interest, and intelligent practice; (iv) critical reasoning; (v) point of view, and (vi) citizenship. Decisively, SL encounters profoundly influence and are supported by teachers and students because SL presents a link between theory and practice and improves students' critical thinking; consequently, adaptability in the labor force.

Teachers as Leaders

The purpose of this exposes to provide a rationale for a diverse array of development methodologies in teacher effectiveness such as strengthening supportive environments, building communication skills, program management, teacher engagement, and skilled program management. Considered are how teachers can use educational leadership and organizational advancement techniques to decide the best STEAM programs available based on scope, time, and costs. Noteworthy is the evaluative aspects of program management through collaborative engagement, execution, and assessment to provide improvement measures. K-12 organizations are extending their missions to foster a future labor force to advance STEAM careers globally. Subsequently, the performance of STAEM program advancement required coordinated effort and information sharing as a significant indicator to connect individuals on an institutional level. Teachers should embrace the advantages of technological work environments to help them

demonstrate the uses of STEAM careers. The advantages are endless and highlight the importance of collegial efforts, administrative support, information sharing, and learning. Better collaboration fosters a better experience for teachers and students alike, and administrative support builds rapport between teachers and administrators. Finally, there are a substantial number of methods for using collaborative educational frameworks, stakeholder relationship management, and choosing the best combination of advanced strategies for program development, initiation, execution, and evaluation. As Steiner et al. (2007) examined, effective leadership must develop both internal and external stakeholders. Innovation and change management develop program quality, strengthen teacher support think tanks, and improve institutional effectiveness.

RECOMMENDATIONS AND CONCLUSION

SPAN endeavors to advance knowledge as a promising practice guide to enhancing the teaching effectiveness of STEAM teachers who teach URM students using technological improvements. The motivation for the program is to understand how technological improvements impact teaching effectiveness for STEAM teachers who teach URM students in high-needs schools. The promising practices guide will provide knowledge-enhancing insights into teachers' scholarly and practical endeavors. The program can be transformational in reshaping professional development for STEAM teachers, especially related to online instruction delivery.

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ADDITIONAL READING

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KEY TERMS AND DEFINITIONS

Diversity and Inclusion: Diversity and inclusion is a calculated initiative initiated and supported by institutional leaders who seek information regarding the nature, degree, and effect of diverse stakeholder obstacles within organizations or society (El-Amin, 2022). Further, the motivation behind diversity and inclusion initiatives is to eradicate micro-aggressions, microaggressions, implicit bias, restricting the advancement of diverse stakeholders from systemic, hierarchical, institutional, social, and cultural impediments.

Science Technology Engineering and Mathematics (STEAM): STEAM is a curriculum based on the premise of developing students in five distinct disciplines of science, technology, engineering, arts, and mathematics. Education occurs in an interdisciplinary and applied approach.

Underrepresented Minority (URM) Students: URM indicates the inadequacy of black, indigenous, people of color (BIPOC) individuals existing with a societal structure.