Co-Developing a Social Entrepreneurship Program with a Focus on Engineering

Dr. Heather Greenhalgh-Spencer, Texas Tech University

Heather Greenhalgh-Spencer, PhD, is an Associate Professor in the Department of Curriculum and Instruction at Texas Tech University, as well as the Associate Dean of the Graduate School. Her research emerges at the intersection of Educational Technology, Pedagogical Innovation, Personalized Learning, Diversity and Equity Issues, and Global Studies. Greenhalgh-Spencer explores practices of using technology and pedagogical innovation to create engaged learning in both formal and informal learning spaces, and in both national and global contexts. She explores diversity and equity issues in the STEM pipeline, and also researches embodied and transdisciplinary learning practices that increase engagement for underrepresented populations in STEM courses. Greenhalgh-Spencer also researches blended / personalized learning (BL/PL) and the ways that BL/PL can create diverse pathways and increased opportunities for all students.

Dr. Tim Dallas P.E., Texas Tech University

Tim Dallas is a Professor of Electrical and Computer Engineering at Texas Tech University. Dr. Dallasâ€™ research includes developing educational technologies for deployment to under-served regions of the world. His research group has developed MEMS-based

azCo-Developing a Social Entrepreneurship Program with a Focus on Engineering

introduction

This paper describes the processes and lessons learned through co-developing a degree program in social entrepreneurship, with a focus on engineering. We worked with students, faculty, business leaders, and funding stakeholders to develop a graduate certificate and master's degree program that (hopefully) will prepare students to leave the university with hands-on experience in building their own businesses that have a social improvement focus. **The paper, and the processes involved in creating this degree program, were undergirded by the following theory of action: degree programs in social entrepreneurship are more successful when they have an interdisciplinary focus, and they are guided by and supported by stakeholder engagement**. In this paper, we start by articulating the theories that undergird our theory of action. We will first focus on theories of interdisciplinary knowledge for social entrepreneurship. We then turn our focus to theories of stakeholder engagement and community-engaged scholarship and teaching. After laying out the theories, we will discuss our context that made the co-development of this degree program possible and necessary. We will then articulate our processes of developing the degree program and tie those processes to the theories of interdisciplinarity and stakeholder engagement. We will close with both a section on "lessons learned" throughout this process, as well as a section on the "deliverables" that have emerged from this process thus far. These 'deliverables' tie to benefits that, we believe, will enhance career preparation for students.

theories of interdisciplinarity

Several theories could have supported our work on developing a program in Social Entrepreneurship. We are aware of the literature suggesting that theories of community-engagement (Tekic *et al*., 2022; Wallerstein *et al.* 2020), and even collaborative building () could have been used to guide this project. However, the development of this project was made possible by a grant from funders who have a particular interest in seeing social entrepreneurship as something that can happen in many different fields and in many different disciplines. They actively desire to break down the traditional silos in the academy. As researchers and co-developers of this program, we agree with them. Interdisciplinarity has been our guiding touchstone from the idea-stage of this project. Thus, it is appropriate to have theories of interdisciplinarity guide our work.

There are many theories of interdisciplinarity, especially as a way of demarcating interdisciplinary knowledge from multi-disciplinary and even transdisciplinary knowledge (Dube, 2021). First, it is important to note that a recent meta-analysis of literature on transdisciplinary knowledge, interdisciplinary knowledge, and multi-disciplinary knowledge found that there is no set definition of any of these terms (Sell *et al*, 2022). Sell *et al.* (2022) found that, of the 1957 records of the term being highlighted, and 344 articles with at least one of these terms in the title, in their meta-analysis they could not find an agreed upon definition, especially when there was a way to define interdisciplinarity, multi-disciplinarity, and transdisciplinarity as distinct from each other. While there does not seem to be one set definition, by and large, interdisciplinarity tends to include the collaborative synthesis of data to form new

knowledges that are then applied to solve complex problems. This is echoed by Krohn (2010) in the *Oxford Handbook of Interdisciplinarity* when he suggests that the defining attribute of interdisciplinary work is that it involves a collaborative understanding, knowledge-building, and application that requires that people not only bring their disciplinary expertise to the table, but then use that disciplinary expertise in a way that leads to a synthesis of knowledge and new insights that could not be made without that synthesis of different knowledges. It is *not* just a division of labor where people from different disciplines work on different parts of a problem and then piece these parts together into an application. This focus on new insights that can only be made through a synthesis of disciplinary knowledge undergirds emerging research on applications of interdisciplinary methods and knowledges in engineering, entrepreneurship, and social entrepreneurship fields.

Multiple studies have shown that interdisciplinary knowledge and methods or key to the success of endeavors that bring together Engineering, entrepreneurship, and a focus on social improvement, especially as this concerns social entrepreneurship. Within the area of engineering education, especially when there is a focus on solving social problems, interdisciplinary work has long been touted as a key component for success (Van den Beemt *et al.*, 2020). For example, Vogel-Houser *et al.* (2020) argue that emerging fields in engineering, such as cyber-physical production systems, require interdisciplinary knowledge and methods. Dubey *et al.* (2020) argue that new trends in engineering education mandate the use of interdisciplinary methods and strategies, and training in those strategies for students. In the area of entrepreneurship, a meta-analysis of 10-year trends in entrepreneurship education has shown that interdisciplinarity has now become a required skill set given that so much of the work of startingone's own business takes interdisciplinary knowledge and collaboration (Yi *et al*., 2021). Winkler *et al.* (2021) echo this conclusion when they assert that both entrepreneurship education and experiential education must support the teaching of interdisciplinary skills. Stenard (2023) writes that entrepreneurship education, especially when it is combined with a focus on engineering or any of the STEM fields, must support interdisciplinary work. Finally, in the area of social entrepreneurship, multiple studies have shown the need to tie social entrepreneurship education to interdisciplinary knowledge and methods. Alkire *et al.* (2020) argue that all training and coursework in social entrepreneurship should be guided by a framework or lens of interdisciplinary knowledge and methods. Gupta *et al.* (2020) conducted a review of the literature and an analysis for future research in social entrepreneurship and asserted that interdisciplinary knowledge and methods were indispensable for success in social entrepreneurship endeavors. Furthermore, Hota (2023) looked at emerging trends in social entrepreneurship and business trends more generally, and found that interdisciplinary groupings, collaborations, and methods would only become more necessary in the future. The literature supports the claim that interdisciplinary knowledge and methods are key to finding success in social entrepreneurship in engineering (and other) endeavors.

The research was the motivating factor behind our insistence that the creation of this new degree plan in social entrepreneurship was to be grounded in interdisciplinary knowledge and methods. We now turn to a focus on theories of stakeholder engagement, as these theories are also crucial to our theory of action and processes for developing this degree plan.

theories of stakeholder engagement

There are several theories of stakeholder engagement that are pertinent to the co-development of this degree program in social entrepreneurship with a focus on engineering. In the social entrepreneurship literature, in particular, theories of stakeholder engagement tend to focus on practices that allow stakeholder to provide knowledge and insights, as well as a sense of oversight into what the company is developing (Desai, 2018). Additionally, the literature focuses on the need to be aware of power dynamics and create a collaborative atmosphere where all stakeholders feel like they have a vested interest in the success of the endeavor and, furthermore, feel like they have the power to protect their own interests while also negotiating the interests of others (Dawkins, 2015). Still others have noted that stakeholder engagement is a leadership style that aims to bring people together who have different knowledge, different aims, and different 'stakes' within a problem or process that would benefit from these disparate knowledges and aims coming together (Patzer *et al.*, 2018). The scholarly literature makes clear that stakeholder engagement is a process that involves collaboration, synthesis, acknowledgment of power, and an intentional practice of ameliorating different power dynamics in order to facilitate the synthesis and stakeholder buy-in that would lead to the greatest chance of success for the endeavor.

There have been multiple studies within the area of engineering, entrepreneurship, and specifically social entrepreneurship that have focused on the need for stakeholder engagement. Kujala *et al*. (2022) conducted a meta-analysis of the literature on stakeholder engagement in entrepreneurship and found that stakeholder engagement was one of the key components to the successful launch and scale of a business venture. Loureiro *et al.* (2020) argue that stakeholder engagement is a key ingredient to success when the focus is on innovation, in any field, but particularly in STEM fields that aim to develop new ideas as well as new intellectual property. Leonidou *et al.* (2020) also argue that stakeholder engagement is important for any entrepreneurial education or training program because stakeholder buy-in is so crucial to any entrepreneurial venture; and that this is particularly true for social entrepreneurship ventures. The literature is clear that stakeholder engagement is necessary to develop, implement, and sustain a successful program that focuses on developing social entrepreneurship skills and launching a social entrepreneurial venture.

Given the literature on the importance of stakeholder engagement, we were keen to involve stakeholders in the whole process of developing this degree. This is why the *co*-development of the degree program was so important to us. The focus on interdisciplinary knowledges and methods, and the focus on stakeholder engagement, oriented our processes in the co-development of this degree program.

our context

The emergence of this co-development of a new degree program in social entrepreneurship came down to several contextual factors. First, we were approached by a group of funders who had a keen interest in developing a social entrepreneurship program that had a stronger focus on interdisciplinary skills. They had noticed a gap in the market for a social entrepreneurship program that aimed to do more than just focus on the development of a business plan, and instead, focused on the many interdisciplinary skills that they thought had made them successful in their own businesses. Most social entrepreneurship programs tend to be located in a business college or are developed as sub-programs within more established disciplinary areas such as

electrical engineering or public health. Additionally, these funders believed that it was important to bring more business stakeholders into the development of the degree program. Often, this is a problem because, by and large, faculty control the development of and approval of all coursework and degree programs. As we talked with them, and as we did our own analysis of the market and the gaps in the market, we thought that we could develop this program using a stakeholder engagement process where on-the-ground entrepreneurship stakeholders would work together with faculty and students in order to develop coursework that would be appealing to the business stakeholders, address that gap that the funders had brought to our attention, and still also bring into the conversation the expertise of the faculty who teach courses in this area (from across the various programs on campus), as well as the students who might be interested in taking these courses as either a graduate certificate or a master's degree.

Our context enabled a unique moment to address a gap in the market with the support of both business and funder stakeholders and also the faculty and students interested in this area. It is because of this context that we were able to go about the *co*-development of this program, rather than the more standard version where faculty develop the program and then ask for stakeholder support.

While our context may have some unique features, the need for programs like this is clear. The U.S. Bureau of Labor Statistics notes that it is difficult to establish clear statistics on the market "needs" for social entrepreneurship endeavors due the very nature of entrepreneurship. Nevertheless, the Bureau notes that these types of endeavors "play a vital role in the growth if the U.S. economy" (Bureau of Labor Statistics, 2016). A 2020 report by the United Nations report further articulates the ways that developing pathways into social entrepreneurship provides a vital and important "path forward for young people to earn a living and help address their communities' needs while advancing Sustainable Development Goals (U.N., 2020). The report, additionally, found that social entrepreneurship pathways can enhance the social inclusion of vulnerable groups" (U.N., 2020). For this reason, many institutions should be considering the development of social entrepreneurship degree programs.

processes for co-developing a degree program in social entrepreneurship with a focus on engineering

Throughout the co-development process, we made space and time to gather the opinions and insights of stakeholders. We were intentional about everyone bringing their own interdisciplinary knowledge, as well as disciplinary knowledge, to the discussion. The co-development process included six steps. These steps are delineated and articulated below.

first step

First, we worked with industry stakeholders and industry funders to define the skills, knowledge and dispositions needed to become a successful entrepreneur whose business model emerges at the intersection of social entrepreneurship and engineering. We did the following:

1. Started with a research-based list of competencies and gathered feedback from industry stakeholders on that list
2. Conducted five interviews with industry stakeholders in order to get a deeper sense of the terms and needs

3. Analyzed that data in order to arrive at a more defined list of needs, and then used that list of needs to develop a call for course proposals that would become official courses in this program

From this data gathering and analysis with industry stakeholders, the following competencies and skills emerged. Students need to know:

A. How to develop the business idea process in a way that meets the needs of a specific marketplace
B. How to develop a business plan that addresses startup, implementation, and sustaining the business
C. How to navigate the 'valley of death' where most businesses fail
D. How to develop funding sources and maintain support for your business
E. How to lead people, and not just manage people
F. How to iterate and pivot in order to be a business leader who adapts to the market

Once we arrived at this skillset list, we developed a general degree plan that included a foundational course, a group of elective courses, and a capstone course that would act as a more focused internship in social entrepreneurship. The industry stakeholders were involved int he development of the foundational and capstone courses. We wanted more faculty input on the elective courses. We worked with faculty who had both disciplinary and interdisciplinary expertise to develop course proposals to meet these needs.

second step

We wanted to make sure that we brought in faculty expertise as part of this process. We also wanted to make sure that faculty still lead and had a voice in the curriculum development and approvals process. To this end, we sent out a "call for proposals" for development, or redevelopment, of courses that faculty could teach that would address these skills and be part of this emerging degree program. We offered faculty a monetary reward for those faculty who both submitted a course proposal and who were selected by our advisory committee (composed of faculty members and industry stakeholders) to have their course move forward. We advertised this opportunity in various TTU-based forums. We gave faculty three months to develop the proposal. As part of their submissions, we asked faculty to submit their syllabus, a cover letter, their CV, and a letter of support from their chair. We received syllabi from faculty across campus, including the largest number from the faculty of engineering (as may have been expected). We then moved on to the review stage of the course proposals that would go into the degree plan.

third step

We assembled a group of engineering and business students to get their feedback on the course proposals, as well as their thoughts about the degree program. Over a series of three focus groups, over 20 students participated. We also solicited their feedback on what might go into the foundations and capstone courses. In order to gather feedback from students, we conducted interviews and focus groups. We annotated the course proposals and asked for specific feedback on how to make the courses better from the students' perspectives. We then drew up a list of students' suggestions for each of the courses. Because we wanted feedback from additional faculty and stakeholders, we also asked for another round of feedback from them after they had a chance to review the feedback from the students.

fourth step

We worked with industry stakeholders and faculty with both disciplinary and interdisciplinary knowledge, who had not submitted a course proposal, to gather more feedback. This feedback took the form of interviews and collaborative annotations of the syllabi and degree plans. The stakeholders and faculty were able to offer activity suggestions for the courses as well as a more honed sense of what should go into the foundational course and the capstone course, now that there was a better idea of the courses that were being proposed as elective courses and after the students had offered their feedback. We then moved to a synthesis activity with the stakeholders

fifth step

At this stage, we wanted to do more to synthesize the feedback and turn that synthesis into final "lessons learned" for the course proposals. Step five focused on changes to the course proposals that came out of the feedback steps above. We drew up a list of the courses that would finally be selected. We also drew up a list of changes that would need to be made to those syllabi. Faculty whose courses were selected were notified. They were also given the list of selected changes. Faculty were asked to enter into a conversation about the suggested changes and feedback on their courses. Regardless of whether the faculty decided to incorporate the changes or not, the faculty whose course was selected were given the monetary reward. However, in order for the course to be included in the degree plan, we asked for the faculty to either make the suggested changes or justify why the changes would not work. At all stages, we wanted to make sure we were respecting the expertise and power of the faculty, while also giving deference to the expertise and power of students and industry stakeholders.

sixth step

Finally, we worked with all stakeholders to take another look at the degree plan. We know that stakeholder engagement and co-development of any program is an iterative process. In that light, we wanted to reassess the gaps in the degree plan. We worked with faculty, student groups, and industry stakeholders to define the gaps that were still missing after we gathered and iterated on course proposals. This involved a redefinition of terms and a redefinition of the remaining needs. We wanted to make sure that we were highlighting the important skills at the intersection of social entrepreneurship and engineering.

This is an ongoing and iterative process. Part of stakeholder engagement, and, indeed, part of interdisciplinary methods requires that we continue to refine and synthesize our knowledge and then apply that to our co-developed program. We continue to meet with stakeholders on an ongoing basis. In the meantime, we are going through the approvals processes for the new courses, and we hope to start this degree program this coming summer.

As we have gone through this process, there are significant "lessons learned" that might be applicable to other endeavors in social entrepreneurship education, with a particular focus on engineering, as well as in other contexts when we are engaging with stakeholders.

lessons learned

There are three key takeaways that emerged from this co-development process. The first takeaway connects the knowledge that was created around key skills and dispositions that are necessary for success in social entrepreneurship endeavors. The next two takeaways concern the development process itself. They are that: 1) creating a fertile ground for co-development

involves being very intentional about power dynamics when bringing together voices from different stakeholders; and 2) that a collective commitment to iteration is key to continued success. We will briefly flesh out those three takeaways below.

dispositions and skills for social entrepreneurship

One of the takeaways from this process was the development of a new understanding of the skills and dispositions that are needed for success in social entrepreneurship endeavors. Relying on our research with industry stakeholders and faculty, we believe that students need to know the following:

A. How to develop the business idea process in a way that meets the needs of a specific marketplace
B. How to develop a business plan that addresses startup, implementation, and sustaining the business
C. How to navigate the 'valley of death' where most businesses fail
D. How to develop funding sources and maintain support for your business
E. How to lead people, and not just manage people
F. How to iterate and pivot in order to be a business leader who adapts to the market

Notice how many of the skills above involve interdisciplinary knowledge and applications of knowledge, and how many of these skills also involve continued abilities to engage with future stakeholders. This was a key insight and has shaped the coursework and degree plan for the program.

creating a fertile ground for co-development

In this process, we saw firsthand the ways that power dynamics can influence what gets said and who is heard. In order to make sure that all stakeholders were engaged in the process—industry leaders, faculty, and students—we had to negotiate power dynamics such that everyone felt like they could talk. This often meant that we tried to carefully balance which meetings were held with stakeholders as an individual group, and which meetings were held when people were brought together. As one of the authors on this paper has noted elsewhere, deep listening in a way that acknowledges power dynamics is important for partnership-building of any kind. "For deep listening to occur, there needs to be an acknowledgment of power, that power circulates, that power shapes relationships, and that power will shape the speaking, the listening, and the understanding of speech. There needs to be not only an awareness of power, but an attempt to ameliorate differential power dynamics, to facilitate deep listening" (Author, 2022). We found this to be true in our work in co-developing this program.

collective commitment to iteration

We have found that there is often a culture in university teaching—perhaps especially in R1 research-focused universities—that iteration of coursework and degree programs are often avoided because there are only so many hours in a day, and iterating coursework often falls below the line of the time that many faculty have to give to the teaching portion of their jobs. In this co-development process, iteration was fundamental to the design process, and more

importantly, iteration continues to be fundamental to both design and stakeholder engagement and buy-in processes. Iteration becomes not only about making important changes to what you teach in the class or how you teach it, but, additionally, iteration becomes a process where we continue to bring faculty, students, and stakeholders into the conversation about the importance of the degree program, the gaps it is trying to fill, and the needs it is trying to address. It is a process of 'holding space' (a concept from Gert Biesta) for change, conversation, and learning anew.

deliverables thus far

This paper has focused almost exclusively on the process of development. We still maintain the idea that a focus on process development is key for co-developing degree plans. A benefit of the co-development process is that one can create stakeholder buy-in along the development pathway. One of the challenges of the co-development process is that the creation of deliverables or reaching benchmarks may have been easier if there were fewer people involved. Nevertheless, this co-development process has yielded the following deliverables:

- The creation of a social entrepreneurship stakeholder board that provided advice on projects and who can act as mentors for students
- The creation of a list of social entrepreneurship dispositions and skills
- The creation of one "foundational" social entrepreneurship course that lays the groundwork for developing the identified entrepreneurial skills and dispositions
- The creation of one "capstone" course that focuses on implementing the skills and knowledge used in the other courses in order to not only develop a business plan with will help students to launch their social entrepreneurship ideas, but also presentation experiences that prepare them to get funders/backers for their ideas
- The creation of four elective courses that are specific to social entrepreneurial skills and that are developed in alignment with the foundational and capstone courses

We are in the process of getting courses approved and marketing this new degree pathway. Students will start courses in summer 2024. Using our board, we will also engage in a cadence of "continuous improvement" conversations to add additional targeting courses, add additional courses that are already taught as part of other degree plans, and iterate on the materials and the degree plan as we better understand the needs of our students. In this way, we hope to continue our focus on interdisciplinarity and stakeholder engagement as the bedrock of continuous improvement for this degree plan.

We also believe that this program will add to the preparation of our students. As shown above, many of the suggested skills and dispositions align with the literature, but it was a strength to have a community stakeholder group that could amplify the need for specific skills and dispositions. It was also helpful to have a board that could suggest activities and assignments that would support the accrual of these skills and dispositions.

limitations and significance

This case study provides an 'on-the-ground' analysis of the steps that went into co-developing a Social Entrepreneurship program with a focus on Engineering. As was mentioned above, there is

very little literature on this process, and thus, this paper fills a gap in the literature. There are also limitations to this paper. For example, we only reviewed the process from the perspective of our institution. We are not aware of other programs that have been co-developed in this manner. While there are other social entrepreneurship programs offered at other institutions, we have not found any literature that delves into their nascence as an interdisciplinary and co-developed program. Having said that, it is possible that other programs have been developed in this manner and we were unable to find literature on that development. Nevertheless, this paper provides a contribution on the ways that this type of co-development was done at our institution, and so may prove fruitful for those interested in developing a program like this at their own institution. This paper may also prove helpful for those interested in co-development processes in general.

conclusion

This paper, and in fact this co-development project, was undergirded by a theory of action around interdisciplinarity and stakeholder engagement. **The paper, and the processes involved in creating this degree program, were undergirded by the following theory of action: degree programs in social entrepreneurship are more successful when they have an interdisciplinary focus, and they are guided by and supported by stakeholder engagement**. The paper has delineated the theoretical commitments, the processes, and the major takeaways or lessons learned from this co-development process.

references

Alkire, L., Mooney, C., Gur, F. A., Kabadayi, S., Renko, M., & Vink, J. (2020). Transformative service research, service design, and social entrepreneurship: An interdisciplinary framework advancing wellbeing and social impact. Journal of Service Management, 31(1), 24-50.

Author (2022)

Bureau of Labor Statistics. (2016). "Business Employment Dynamics: Entrepreneurship and the U.S. Economy". Retrieved on March 26, 2024. https://www.bls.gov/bdm/entrepreneurship/entrepreneurship.htm

Dawkins, C. (2015). Agonistic pluralism and stakeholder engagement. Business Ethics Quarterly, 25(1), 1-28.

Desai, V. M. (2018). Collaborative stakeholder engagement: An integration between theories of organizational legitimacy and learning. Academy of Management Journal, 61(1), 220-244.

Dube, B. (2021). Why cross and mix disciplines and methodologies?: Multiple meanings of Interdisciplinarity and pluralism in ecological economics. Ecological Economics, 179, 106827.

Dubey, A. K., Mukhopadhyay, A., & Basu, B. (2020). Interdisciplinary Engineering Sciences: Concepts and Applications to Materials Science.

Gupta, P., Chauhan, S., Paul, J., & Jaiswal, M. P. (2020). Social entrepreneurship research: A review and future research agenda. Journal of business research, 113, 209-229.

Hota, P. K. (2023). Tracing the intellectual evolution of social entrepreneurship research: Past advances, current trends, and future directions. Journal of Business Ethics, 182(3), 637-659.

Krohn, W. (2010). Interdisciplinary cases and disciplinary knowledge. The Oxford handbook of interdisciplinarity, 31-49.

Kujala, J., Sachs, S., Leinonen, H., Heikkinen, A., & Laude, D. (2022). Stakeholder engagement: Past, present, and future. Business & Society, 61(5), 1136-1196.

Leonidou, E., Christofi, M., Vrontis, D., & Thrassou, A. (2020). An integrative framework of stakeholder engagement for innovation management and entrepreneurship development. Journal of Business Research, 119, 245-258.

Loureiro, S. M. C., Romero, J., & Bilro, R. G. (2020). Stakeholder engagement in co-creation processes for innovation: A systematic literature review and case study. Journal of Business Research, 119, 388-409.

Patzer, M., Voegtlin, C., & Scherer, A. G. (2018). The normative justification of integrative stakeholder engagement: A Habermasian view on responsible leadership. Business Ethics Quarterly, 28(3), 325-354.

Sell, K., Hommes, F., Fischer, F., & Arnold, L. (2022). Multi-, inter-, and transdisciplinarity within the public health workforce: a scoping review to assess definitions and applications of concepts. International Journal of Environmental Research and Public Health, 19(17), 10902.

Stenard, B. S. (2023). Interdisciplinary skills for STEAM entrepreneurship education. Entrepreneurship Education and Pedagogy, 6(1), 32-59.

Tekic, A., Zerjav, V., & Tekic, Z. (2022). Evolution of project studies through the lens of engaged scholarship: A longitudinal bibliometric analysis. International Journal of Project Management, 40(5), 531-546.

United Nations Report (2020). “Unlocking entrepreneurship opportunities for youth could lower unemployment and bring social benefits”. Retrieved on March 26, 2024. https://www.un.org/development/desa/en/news/social/2020-world-youth-report.html

Van den Beemt, A., MacLeod, M., Van der Veen, J., Van de Ven, A., Van Baalen, S., Klaassen, R., & Boon, M. (2020). Interdisciplinary engineering education: A review of vision, teaching, and support. Journal of engineering education, 109(3), 508-555.

Vogel-Heuser, B., Böhm, M., Brodeck, F., Kugler, K., Maasen, S., Pantförder, D., ... & Lindemann, U. (2020). Interdisciplinary engineering of cyber-physical production systems: highlighting the benefits of a combined interdisciplinary modelling approach on the basis of an industrial case. Design Science, 6, e5.

Wallerstein, N., Oetzel, J. G., Sanchez-Youngman, S., Boursaw, B., Dickson, E., Kastelic, S., ... & Duran, B. (2020). Engage for equity: A long-term study of community-based participatory research and community-engaged research practices and outcomes. Health Education & Behavior, 47(3), 380-390.

Winkler, C., Winkel, D., Shields, J., Barber III, D., Levin, D., & J. Zane, L. (2021). Special issue on interdisciplinary and experiential entrepreneurship education. Entrepreneurship Education and Pedagogy, 4(2), 96-99.

Yi, S., & Duval-Couetil, N. (2021). Interdisciplinary entrepreneurship education: Exploring 10-year trends in student enrollment, interest and motivation. Entrepreneurship Education and Pedagogy, 4(2), 100-118.