PEP Talks: Podcast on Educational Possibilities powered by the National Coalition of Girls' School

Episode 5: From STEM to STEAM: Girls' School Leading the Way- Transcript

[00:00:00] **Olivia Haas:** [00:00:00] When we look at projected job growth, all fields across the STEM industry, science technology, engineering, and math are expected to continue increasing at a much faster rate over the next 10 years than the average for other occupations. Unfortunately, what always continues to increase within STEM related jobs is the gender gap. Women account for less than one third of employees around the world, working in scientific research and development, only 26% of computer scientists are women and even more disheartening women account for only 13% of engineers. The world is desperately seeking to plug the leaky STEM pipeline from its shortage of women.

[00:00:39] Girls schools are playing a critical role. They lead the way in graduating young women who become scientists and doctors engineers programmers and inventors. Hello, and thanks for tuning into pep talks podcast on educational possibilities produced by the National Coalition of Girls Schools. I'm your host Olivia Haas.

[00:01:00] [00:00:59] Research shows girls school grads on average report, greater science self-confidence than co educated peers and their ability to use technical science skills, understand scientific concepts, generate a research question, explain study results and determine appropriate data collection. Girl school grads are also six times more likely to consider majoring in math, science, and technology, and three times more likely to consider engineering careers compared to girls who attended co-ed schools.

[00:01:30] Why are girls school so successful in graduating at disproportionate number of young women interested in pursuing STEM-related degrees? I'm going to explore that question in today's episode with the leaders of two NCGS member schools. Joining me will be Dr. Liz Hicks, who serves on the NCGS board of trustees and as the founder and principal of Girls, Academic Leadership School known as GALA. GALA is the first girls public school in the Los Angeles Unified School District. It [00:02:00] opened in 2016 and offers grades 6 through 12. Also joining me will be Nanci Kaufman. Who's Head of School, at Castilleja, educating young women since 1907.

[00:02:11] Castilleja also serves students in grades 6 through 12 Castilleja is located in Palo Alto, California in the heart of the Silicon Valley and Los Angeles, where GALA is based is now home to more than 500 tech companies earning it the nickname of Silicon beach, both schools provide

STEM and steam curricula as innovative as the mini startup tech companies surrounding them.

[00:02:36] Before my guests join me. I've asked Megan Murphy, Executive Director of NCGS to briefly share an exciting announcement. Megan, I understand NCGS has an incredible new opportunity available for young women passionate about STEM subjects.

[00:02:51] **Megan Murphy:** [00:02:51] Yes, we do. And I'm very excited today to announce our new Hafize Gaye Erkan. First Republic [00:03:00] bank fellowship program, which is going to help foster STEM education, leadership, and career paths for young women from underserved backgrounds at our schools. Erkan fellows are going to receive a scholarship equivalent to 20,000 us dollars and three layers of mentorship, including a teacher business professional and an executive leader.

[00:03:23] First Republic bank has been a long time partner of NCGS and they've designed a fellowship that I think is going to provide a holistic and comprehensive approach that's going to support young women as they develop into lifelong learners and future transformative leaders.

[00:03:40] Gaye Erkan is the president and board member of first Republic bank. And she's really the inspiration Olivia for the fellowship program. Gaye is an example, um, an extraordinary example of education, creating opportunity and leadership in the STEM fields. Gaye grew up in Turkey where her passion for [00:04:00] learning and math led her to earn a PhD from Princeton University. In applied mathematics and also in probability theory, I want to extend sincerest thanks to Jim and Cecilia, Herbert, and first Republic Bank for this funding that I think is going to be a life-changing opportunity for the fellows at our member schools.

[00:04:21] The nomination process for the fellowship is open right now and will stay open through March 15th. NCGS member schools may nominate one of their students who is currently in the ninth grade. And there are many more details about the application that can be found in our annual prizes in grant section of the NCGS website@andcgs.org.

[00:04:45] **Olivia Haas:** [00:04:45] This is a really amazing opportunity. Thanks so much, Megan, for sharing a little bit of info about this exciting new fellowship program. Before I speak with Liz and Nanci, let's clarify what exactly is STEM? The acronym was [00:05:00] introduced 20 years ago to reflect fields and curriculum centered on education and the disciplines of science, technology, engineering, and math, the STEM education movement advocates moving away from segmented content areas.

[00:05:13] To instead emphasize connecting the subjects and relating teaching to the outside world. STEM education impresses 21st century skills acquisition so that students gain proficiency in collaboration, questioning problem solving and critical thinking. Just to name a few.

[00:05:30] Many schools have now added to STEM an "A", which stands for art and call the acronym steam. They champion that design thinking and creativity are essential ingredients for innovation. Which is essential in all STEM disciplines.

[00:05:44] The disciplines themselves have also expanded considerably over the last 20 years to encompass within STEM, everything from computer science, coding, robotics, aeronautics, rocketry, design thinking, and maker spaces.

[00:05:59] And a [00:06:00] Makerspace is a collaborative workspace for tinkering making, exploring, creating, and sharing. The tools and materials can vary greatly from high-tech equipment like 3d printers and laser cutters, and even sewing machines to hammers and saws to no tech equipment, really like cardboard, yarn, Legos, and art supplies.

[00:06:22] So Liz and Nanci, thank you so much for joining me today. Let's jump right in Liz. You founded Girls Academic Leadership School five years ago, specifically as a STEM school. Why did you feel it was important to start a STEM school for girls?

[00:06:37] **Liz Hicks:** [00:06:37] It's so nice to be here. I started the, uh, girls academic leadership Academy.

[00:06:41] Um, it actually took about three years to get started, um, through our school district. At that time in Los Angeles. If you wanted to go to an all girls school, you were paying upwards of $30,000 a year and it was just not equitable in our city. For me, it was much more of an issue of equity in the [00:07:00] city and, um, Being able to produce this model for our girls.

[00:07:05] But as I started doing more and more research, I saw that within our school system and it's pretty much true around the country. Girls and boys were actually completely equal in elementary school. With their test scores in math and science, but they hit middle school.

[00:07:21] And all of a sudden the girls test score was lower and their interest waned in science and math in particular and in computer science. And then you found them not taking the AP courses in high school of computer science, uh, you know, chemistry, biology, physics. And you also saw that in college majors, there weren't a lot of, uh, women going into STEM and as college majors or they would start in SIM and then drop out of STEM. So I really wanted to build a pipeline for the STEM careers for our girls, so that they would have that high interest. When they came to us in sixth grade, we keep that high interest [00:08:00] in middle school and then move into really encouraging our girls to take AP STEM courses in high school and hopefully get them into college and, uh, uh, in the STEM field.

[00:08:11] **Olivia Haas:** [00:08:11] Great. Thank you. And Nanci Castilleja incorporates the "A" for art to offer a steam curriculum. What's your school's philosophical approach to STEAM education?

[00:08:23] **Nanci Kauffman:** [00:08:23] So thanks for having me here, Olivia. I would start by saying that for us at Castilleja, whether it's STEM or STEAM. We are thinking a lot about hands-on exploring emerging technologies, solving simple problems, solving complicated problems, tinkering making and what we have found is when we were talking about STEM students started to define themselves, Oh, I'm a STEM girl. Oh, I'm not a STEM girl. And the arts teachers in particular, but also the [00:09:00] humanities teachers began to feel concerned that students were missing out on the fact that digital photography sound editing.

[00:09:11] There are many ways in which science technology, engineering and math need to be applied to the arts. And something occurred to me today, which is that. If you think about this current zoom world that we're living in, some of the best applications have been in the arts, the, the singing productions that we've all witnessed. That's technology.

[00:09:35] And so we just wanted to be sure, particularly being in Silicon Valley, that every student. Who graduates from the school has had a really direct hands-on experience that has her feeling like a tinker, a discover, a maker, a risk-taker. We invested, we got a grant to invest in a letter press, which is actually quite a [00:10:00] bit of hands-on technology.

[00:10:02] And that has been hugely popular. It's a program that's run by librarian and, um, one of our English teachers, but it also obviously has quite a bit of graphic design integrated into that.

[00:10:17] **Olivia Haas:** [00:10:17] So many schools today and girls schools in particular are offering STEM or STEAM curricula. What are one or two aspects of each of your school's programs that are a signature focus? Nanci, let's start with you because the letter at Castilleja is a really cool example. Are there other signature focuses of your program that you'd like to expand on?

[00:10:38] **Nanci Kauffman:** [00:10:38] Sure. I would say that our STEM program really took off about 15 years ago when we introduced robotics. And robotics started out in a closet with a handful of girls going off to competitions and just not doing very well, but just feeling [00:11:00] glad they were there.

[00:11:01] And that program has grown and grown and grown. It is a signature program at our school. Our robotics team, we do participate in first robotics, which is just one of a handful of leagues. Out of that robotics program came our Makerspace. And a real commitment to build a major maker-space Castilleja I was fortunate enough to be early on in introducing Makerspace across the curriculum.

[00:11:32] We had a partnership with Stanford. There was a professor there he's not at Stanford anymore. Uh, Pal Blitzstein who launched the Fab Lab concept, where he was going to schools and training teachers to integrate making across the curriculum. Coming out of the, the robotics program and the successes and failures and challenges.

[00:11:59] We [00:12:00] began building a computer science department and engineering department. We now have a required computer science course in the ninth grade, and we require students to take it in the ninth grade. And that's really important for us because we don't want it to be. a, check the box. You have your CS course requirement, but really a foundation for being able to apply computer science in your other classes.

[00:12:27] So teachers can plan curriculum in the upper school, knowing that students have taken computer science.

[00:12:36] **Olivia Haas:** [00:12:36] Liz, I know gala has a flight simulator on campus among many other amazing resources and opportunities for your girls. What are some of the signature aspects of your school STEM program?

[00:12:46] **Liz Hicks:** [00:12:46] So similarly to Nancy, um, we do have a robotics program. We started it, actually, our girls started it, um, in order first robotics as well. And what we love about that program is it forces the girls, not just [00:13:00] to tinker with the robots and build the robots. They have to do community service. They have to build a website. They have to do PR they have to do marketing.

[00:13:09] So it's kind of a very well-rounded program, which we love. We do have a aerospace class and then really came out of being connected to Southern California aerospace, uh, uh, industry. Um, we're pretty far geographically away, but, um, in our first year we had the opportunity to meet with the, uh, women of color, uh, Engineers at aerospace corporation in Elsa Gundo and our girls were just enthralled to see women of color. Like our school is 78% girls of color, uh, in this field, uh, being in charge of these, you know, huge things that we're going up into space and all the different pieces of that. Um, just really charged their imagination. And so, uh, we have [00:14:00] a wheel of electives in the, um, seventh period. Every girl gets to choose an elective and there a vast variety of electives, but it's engineering, it's robotics, it's, um, underwater roving vehicles.

[00:14:13] It's a bunch of different things that they can do. Hands-on and I think. What we realized really quickly in our first year, because we built a middle school and a high school at the exact same time, which was a little bit crazy. And we started with six and ninth grade. Um, and then we've, um, last year was our first year, six to twelfth.

[00:14:32] And we had our first graduating class, which is absolutely phenomenal. And of course, They had no graduation, but they had a virtual graduation. So we had to learn all the technology behind that, but of any

class, they were the ones that could handle that. So I'd say our, our electives that the students can choose from and they, there.

[00:14:53] Multi-grade electives. So you have six to 12th grade in the same elective. We have a, uh, [00:15:00] broadcast class where we have a good morning GALA every week and, um, kind of the announcements and the news of the day and that kind of thing that I think what makes it our signature, some are STEM school. So we have a lot of requirements for the girls, but I think what, uh, two things that kind of make us unique is our, um, idea of growth mindset.

[00:15:20] Uh, we start that as soon as sixth grade, where w when the girls come in and we want them to make mistakes, and that really comes from us STEM, um, idea. You, you have to make mistakes as you're doing experiments to learn from them and figure out what experiments will work and what won't, Uh, with the math it's always experimental of how can you, uh, understand these serums and how can you look at different ways of solving problems? So the idea of growth mindset really permeates our school. And, um, and again makes us unique in terms of the combination of STEM and growth mindset. Um, and then really to development of social, emotional [00:16:00] learning, and resilience.

[00:16:01] We know that these girls are going to be some of the only women of color in the room, in the, uh, STEM fields that they're going into. So we have to build up their resilience and their reliance on mentors, um, so that they have a way of navigating that and not quitting the field because particularly African-American women are flying out of the STEM field and we want them to stay in, uh, to have that the unique perspective that each one of our girls have, um, coming from 81 zip codes around LA and having many, many different experiences and backgrounds.

[00:16:40] **Olivia Haas:** [00:16:40] So that's actually a beautiful segue, Liz, to what I wanted to talk about next, which is how girls learn best and how you incorporate that into STEM.

[00:16:47] As a result of many schools, giving focus to STEM and STEAM, we're finally starting to see somewhat of a shift, even though women are still a minority in most STEM fields. As you have noted, they're no longer a minority in [00:17:00] certain STEM subjects at the high school level, they're now really dominated in the life sciences in particular.

[00:17:05] There are actually more women today in high school, advanced placement, biology, chemistry, and environmental science exams than men. And also half of the medical school graduates are women, which has previously sort of this unimaginable statistic. However, there are particular subjects that you both know such as AP physics, computer science and math that still have a significant male dominance.

[00:17:30] There are five boys for every one girl in AP physics, for example. So to help counter this issue, a group of researchers at the University of California, Berkeley have been looking at. Why women choose specific STEM fields and solutions for increasing women in STEM subjects. Based on their findings they're advocating to rebrand STEM into TEAM, which stands for technology engineering, applied physics and math. They're also encouraging a team or [00:18:00] collaborative based project learning. So as experts in how girls learn and girls school educators really know that collaboration in the classroom is extremely effective for girls as this growth mindset.

[00:18:12] How do you incorporate what we know about how grown girls learn best into your STEM and steam curriculum and Nanci, we're going to start with you because I know that this is something that you have actually, um, talked about before this concept of team.

[00:18:26] **Nanci Kauffman:** [00:18:26] Yeah. Wow. There's, there's a lot there. And in many ways, I feel as though Liz started to answer that question.

[00:18:35] When you think about the life sciences and medicine, um, that they're much more predictable pathways. I mean, it's very clear how you become a physician. Something that I picked up on as we were talking, I believe that for high school girls, even middle school girls, Being connected to the real world early on is super motivating [00:19:00] and is, is it's relevant because I think as people are thinking about what to do at their schools, people who are listening to this, it's probably really important to consider where are the partnerships that you can create locally?

[00:19:15] That will teach girls early on the kinds of things that Liz was talking about, about finding mentors, um, about, um, w w learning from these folks, what was the growth mindset for them? And then I would say that, you know, more, more than the teamwork, I want to make sure we don't, um, automatically equate well, you know, the only way we can appeal to women is if we have collaboration, I mean, it is true that teamwork is important in the STEM fields, but I think teamwork becomes relevant when the problems that you present require that it's a matter of different kinds of expertise coming to the table.

[00:19:58] So it's not [00:20:00] collaboration for collaborations sake, it's collaboration because these fields. Where you are going to make mistakes where the problems are complicated, require different points of view, different skills. And I believe that when girls and young women see that that's, what's exciting. Remember that the, one of the things we have to be wary of as girls' schools is the perfectionism that can come about.

[00:20:30] Well, that's the opposite of risk-taking and, and being okay. Failing and making mistakes. So I think that's more of the critical piece and perhaps being on a team makes that easier to accept because it's not personal. But I think some of the elements that we've talked about, the real world

connection, the hands-on learning, the complex problems are probably more important than whether we call it STEM or TEAM.

[00:20:58] **Olivia Haas:** [00:20:58] Liz. Do you have thoughts to [00:21:00] add?

[00:21:00] **Liz Hicks:** [00:21:00] I am going to kind of challenge, um, the way we're thinking. Um, I just did a just quick dive, not a deep dive into California, AP, um, test takers, um, today and in the state of California, there were 35,000 students that took the AP bio exam of that 35,000. And of course, this is not to segregate it by male or female.

[00:21:27] There were only 768 African-American students. In, uh, calculus, BC, there were 20,000 students in our state that took it only 240 African-American students. So when we're saying we're getting to equity, I really can't agree with that because we are leaving whole population out of the room. For some of our populations. Yes. We're having equity in terms of medical school and opportunities. And, uh, AP course, you know, um, [00:22:00] being able to enroll in AP courses, and having access to the curriculum, but that is definitely not true for, um, African-American students. And when I looked at, um, Hispanic students, which are the majority, it's like category in our state, uh, the majority of the students in our state, we still see similar statistics where, um, particularly for science, uh, computer science, um, and mathematics there. Um, The exams, aren't there, the encouragement as a former counselor, the encouragement by counselors or teachers to take these exams or take these hard courses.

[00:22:35] Um, it's just not there. And so they're being, um, either counseled out or a recommendation out of, um, these courses and it's just, um, it isn't equitable. So I think, um, really making sure that we are encouraging students to take these, uh, these courses. Um, in our school, we have about [00:23:00] 60% to 70% of our girls taking, uh, these AP classes.

[00:23:05] Part of that is you have to have teachers that are willing to teach a variety of students. A lot of our AP teachers are used to getting the, you know, the top students in the school and not having to work so hard to teach if for someone who maybe hasn't had the access to the curriculum yet, and might need a little bit more work and a little bit more guidance.

[00:23:28] So I think having a. Uh, I agree with Nanci, the name of what we call it is doesn't really matter. Um, STEM has been pretty well established across the country, making a change name. I don't think it's really going to do much. Um, but I feel like there's some real underlying issues that need to be examined and, uh, worked on together to, to make sure that there, there really is equity.

[00:23:56] **Olivia Haas:** [00:23:56] You make excellent points. Liz, that gender equity [00:24:00] obviously is. Is not the same as racial equity, socioeconomic equity, uh, that we need to really examine what we mean when we say equity and how, how are we defining it? Switching gears just a little bit. What

are some of the non knowledge-based skills or lessons girls gain from engaging in a robust STEM or STEAM or TEAM or whatever you want to call it? Program?

[00:24:24] **Liz Hicks:** [00:24:24] There are a number of skills that I was talking before about growth mindset. Um, you have to make mistakes in order to, to learn. Um, there are going to be many times you're not going to be able to be perfect and you're going to have to, um, uh, learn about that. Um, I think, uh, critical thinking and, um, research skills are something that come out of a STEM curriculum and.

[00:24:49] Really having some, uh, innovation, uh, you have to figure out another way of doing things. I know with our math program, um, we are doing college prep, math, [00:25:00] and there are multiple ways to get to the same answer. So having that idea of resilience, trying different things, uh, using innovation are some of the more, I guess you'd say soft skills.

[00:25:12] Not. Knowledge-based skills that students get from a STEM curriculum. Um, I think some objectivity, um, in terms of when you're, observing something and then making, um, writing down in a certain way, uh, with math and specific science and even computer science that, that objectivity as well as, um, sequential events, particularly with experimentation, then you, you have more of a logic type of thinking, um, that gets developed.

[00:25:44] **Olivia Haas:** [00:25:44] Nanci, what would you like to add?

[00:25:47] **Nanci Kauffman:** [00:25:47] I agree with all the things that Liz said, and I think that. She really mentioned many of the important ones. The only thing I can think about adding for one thing, when we think about design [00:26:00] thinking as a, as a form of problem solving, there is a level of empathy and compassion that's sort of built in to the idea of thinking about the user experience when you're developing technology or when you're thinking about solutions. Liz mentioned, uh, the community service element of the robotics team. And I do believe that our students are developing an understanding of the discrepancies that exist in access to STEM education.

[00:26:32] And that's something that's been a focus for, uh, the community outreach that our students have been doing.

[00:26:38] Two other things I would add. One is, you know, we're living in times where, um, it's very easy to amplify false information. We've seen that in, in social media. I do think that the STEM field encourage our students to think more deeply about evidence and [00:27:00] about data as a way of, I mean, that's where the critical thinking comes in.

[00:27:05] And the last thing I would. I would add is that the world has become so, um, scientifically complicated. Think about viruses and backseat scenes and 5G networks and just how the internet works. That there's, there's

quite a bit that can, um, you know, an educated person needs to understand. And I do think that regardless of where a woman is headed. It's, it's important not to be in a situation where you kind of just have to throw your hands up and say, well, I, I don't understand that. Like, I'm not good at that. I've never been able to do that. To me that's, that's an asset based way of thinking.

[00:27:56] **Olivia Haas:** [00:27:56] So as both of your schools work to try to help [00:28:00] encourage more girls go into, uh, study STEM in college and the STEM industry after, after college, how do you help girls see it in order to be it? When it comes to being a woman in a STEM career, how do you expand preconceived notions of what STEM related careers can be? Nanci, would you like to start?

[00:28:18] **Nanci Kauffman:** [00:28:18] Something that we do quite a bit on our campus is. Have panels of alums come back who have pursued all kinds of STEM and humanities fields and to talk to students, not just about what they do, but what was the path, what were the challenges that they faced?

[00:28:42] What were the obstacles? How did their Kassala education prepare them to overcome? For our school we think pretty strategically about. The people that we invite to speak to our students, uh, the diversity of, of the, the speakers so [00:29:00] that every student can see herself speaking or presenting. We, we actually have moved to, uh, an advanced topics program.

[00:29:11] We don't teach the, if exactly the AP curriculum, but in our engineering two class. There was a whole unit on the biases that women experience in engineering class discussions and exploring questions and themes that are related to why are there few women in the field? What will it be like as a woman in the field?

[00:29:34] So that it's very consciously and intentionally explored and talked about. I should add one other thing, which is that. We do have, um, a number of internships that students participate in. Some of those are, um, science research internships. We have a program whereby students can get a programming, mentor, someone in the [00:30:00] community who is their sort of computer science go to. A woman who can, um, you know, help them when they are getting stuck. And then of course those relationships build

[00:30:14] **Olivia Haas:** [00:30:14] Liz. What are your thoughts on helping girls see it to be at in STEM careers?

[00:30:18] **Liz Hicks:** [00:30:18] Well, our school is only five years old. So unfortunately we do have, we've only had our first graduating class, so we don't have enough alumni yet to, um, to come back and help our girls to see it.

[00:30:29] And, uh, although we do have a couple of girls that are going to come back and lead a panel for our, uh, class of 2021 of what's it like the first semester in college, because of at our school, 80% of the girls that graduated were the first, uh, in their, um, family to go to college. So, um, a hundred percent of them graduated on time and a hundred percent of them got accepted to college, um, with one choosing to go to the air force, um, because she does want to [00:31:00] go into the aerospace industry.

[00:31:01] And that is one of the pathways, uh, for girls or for anybody to go into aerospace, um, is through the air force. So, um, I think being open to exploring alternative pathways such as that, um, is a really good, uh, good way of exposing girls to the different fields. I think for us, we have put a lot of our resources into field trips to companies.

[00:31:25] So we go out on about when we're not in COVID times, we go on about 25 field trips a year, uh, to places like Space X, Aerospace Corporation, uh, Google, Fandango, um, any of the. Corporations that are large in our community that we can be connected to. And we've been really lucky to connect in well with the city of Los Angeles.

[00:31:48] So the LA Department Water Power, um, has sponsored a bunch of field trips for us to go to water, treatment plants and power plants. And how, how are we using our [00:32:00] resources in our community and conserving our resources. And I think that particularly appeals to young women because they are looking at how can I help?

[00:32:10] What can I do to make things different? So we do that and we've also done some, uh, connections to, uh, different politicians in our area who have come and talked to the girls about that whole idea of being a leader and being elected to office. Um, and so I think just really exposure is one of the biggest things for our girls.

[00:32:32] They need to be able to see all the different fields that they could go into many that they might've never even heard of or been exposed to. So I think exposure is one of the biggest things for girls that they may have only been exposed to a certain amount of professions in their life. So kind of exposing them to this vast array of professions.

[00:32:53] Um, we, uh, we're lucky also to go to the Dodgers, uh, organization and meet with the [00:33:00] statisticians behind all of the things that happen with the Dodgers. And so now we have a bunch of girls interested in, Oh, I want to go into stats. I can do stats for baseball or for soccer. Um, so. A lot is just exposure for them to see there's this whole array of fields out there that they could be part of.

[00:33:20] **Olivia Haas:** [00:33:20] I love that. That is so inspiring. So. During my introduction, I noted how rapidly STEM related careers will be growing over the next 10 years in particular, the ever evolving tech sector obviously. In many ways, you're having to prepare students for future careers that might

not even exist yet. How do you approach this challenge? Liz? How about you feel this one first?

[00:33:44] **Liz Hicks:** [00:33:44] Other things that we've already talked about? Um, Building that growth mindset, um, being willing to do innovation, um, experimentation, um, having that resilience, um, you know, and [00:34:00] knowing that you're not always going to be going one pathway, you might start. I mean, we look at the research of how many changes job changes that, um, people do in their careers now because of the fact that everything changes so rapidly, um, We really have to have that idea of, you know, there's not this just one pathway to go there's could be several pathways and you're right.

[00:34:23] We don't know what the future's going to look like. Um, look what just happened in last year and how many job changes have happened just as a result of the change with COVID and, you know, segments of the economy that we never, that would grow, um, rarely are kind of helping to develop the mindset and skills.

[00:34:43] Um, For the future, not knowing what the future jobs to get, to look like.

[00:34:49] **Olivia Haas:** [00:34:49] Nanci, your thoughts?

[00:34:50] **Nanci Kauffman:** [00:34:50] So we are here in, uh, Silicon Valley and we are in the middle of the tech sector. And what we're [00:35:00] seeing is that being in the tech sector could mean anything from being at the ground floor as a coder, all the way to being a CEO and a founder. And the exposing students to that array has, um, I think prepared them to understand that it's, it's not always clear what direction they're going to go in, even within a given field.

[00:35:28] So, um, you know, developing a software app and then launching it and marketing it is, uh, as, as students hear about these stories, I think they're recognizing.

[00:35:41] Oftentimes, we make our own paths in these fields and it's been, um, it's been inspiring and, and it's created, I think kind of like a creative confidence, like a confidence in your own ability to intersect [00:36:00] your, your tech knowledge with the leadership skills that you have, the creativity, the problem solving and bringing all of that together will allow you to be flexible and agile.

[00:36:13] We talk about agility actually quite a bit at the school. We talk about the initiative and agility and how those work together. And I think those are the skills that are going to prepare students for. The kind of unpredictable career world that they'll be facing.

[00:36:31] **Olivia Haas:** [00:36:31] My last question for both of you is related to how girls schools have always been pioneers leading the way that girls are taught STEM subjects. Girls schools today are really shaping the narrative for current and future generations who will help plug the leaky STEM pipeline. As you look ahead, five or ten years from now, how do you foresee STEM and steam education will continue to evolve?

[00:36:55] **Nanci Kauffman:** [00:36:55] So we've begun to establish at our school a set [00:37:00] of interdisciplinary content areas that we're going to commit to, um, as part of our curriculums. So emerging technologies, environmental sustainability, social justice, these, these are some of the examples. And I do believe that as we move ahead in education in general, but specifically in the STEM or STEAM fields, we're just, we're going to see more, uh, of, of this integrated applied approach to teaching and learning.

[00:37:37] You know, we went through a phase of being very subject oriented. I think schools were very subject oriented and then we went through this.

[00:37:47] Well, now we have to teach the 21st century skills. I think the next iteration is applying those 21st century skills to, uh, [00:38:00] Being more clear about what is the content that those need to be applied to? What are the, the intractable issues and problems that this next generation is going to need to solve?

[00:38:14] And how do we bring those more into the classroom and have them become sort of the bread and butter of how we teach? One example of that would be, we think about the number of schools as they're rebuilding. Are building, uh, sustainability into the building so that it becomes part of everyday life in the curriculum.

[00:38:36] I think we're going to see more and more of schools kind of living and operating with a major commitment to these, these broader issues that the disciplines and the skills come together around. Something. I also see in the future of STEM education is something that [00:39:00] happened at our school. Recently, each year we devote the first week of January back at school to some kind of a global theme.

[00:39:10] This year, we looked at world health and pandemics and examined what are the ways that our countries need to work together on global medical issues? And what was interesting to me is over and over again, what came out was whether it was the speaker or the student's questions, the concerns about the injustices in our healthcare systems and the access to quality health care.

[00:39:41] And I think something that we can expect from the next generation is how these social justice issues. And I mean, Liz, your school is, is devoted to that. So it's probably in the water you drink in the air, you breathe every day, but I'm not sure that's the case that a lot of other girl's schools. [00:40:00] And, um, yet I, our students are going to be demanding that of us.

[00:40:05] And they're going to insist that we. Um, whenever we look at, um, new technologies and access to opportunities that they will bring a social justice lens to those, uh, conversations. And we need to be prepared for that.

[00:40:23] **Olivia Haas:** [00:40:23] Liz, your thoughts on this subject.

[00:40:25] **Liz Hicks:** [00:40:25] Top on my mind is the inauguration yesterday of the first woman, woman of color as vice president.

[00:40:31] And it makes me so hopeful that the STEM pipeline might get bolstered and we'll see even more, uh, glass ceilings shattered. Um, so that is my hope in the next, uh, five to ten years. Sometimes you think change isn't gonna happen. And all of a sudden it happens. So I think we're on the cusp of many changes, um, in education.

[00:40:56] And then also in STEM in particular, [00:41:00] I think, um, we're discovering more and more every day and being part of that is really exciting, but I also feel like we are moving more towards integration of every topic. So I agree with you Nanci, that when we were looking at things that our school we're looking at integrated projects for every grade level, and that does integrate every part of every aspect of their learning, into looking at a problem of practice.

[00:41:29] Um, and how, how do we tackle this problem, how do we make changes? How do we affect change? And I think we're moving probably more that direction where we're really looking at, there are things that we can solve in our community, in our worlds that we need to be very creative and innovative, and we need to pull from the arts, the humanities, the sciences to solve them.

[00:41:54] So I think it's almost like a full circle of, as Nancy was talking about, we kind of separated out [00:42:00] and now we're coming back together and, um, it'll be interesting to see what happens to the next five or ten years. And I'm excited.

[00:42:07] **Olivia Haas:** [00:42:07] I just want to thank you both so much for your really thoughtful and insightful answers.

[00:42:11] I think you have given our listeners a lot to think about and you're right. Liz, I think ending with saying that you're excited for what the future holds. For STEM and STEAM education is a great place to end our conversation. So thank you both so much.

Thanks for listening. Like what you heard, be sure to subscribe to Pep Talks, podcasts on educational possibilities and leave a rating and a review.

[00:42:37] Stay current on the latest NCGS offerings, resources and research by subscribing to the coalition connection newsletter found in the news section@ncgs.org and be sure to follow us on Twitter at girl schools. Pep talks is produced by the national coalition of girls schools. The leading advocate for girls schools, [00:43:00] connecting and collaborating globally with individuals schools and organizations dedicated to educating and empowering girls.