



## MIRADES. L'EDUCACIÓ COM A FUTUR

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## MIRADES. L'EDUCACIÓ COM A FUTUR

Retrospectives, sinceres, optimistes, honestes, compromeses, apassionades, humanes, prudents, creatives, crítiques, ingènues, experimentals, properes, complexes, atrevides, reflexives i vitals. Mirades és un compendi de diverses maneres de veure l'educació des de diferents punts de vista i indrets del món. Mirades que parteixen de la individualitat, però que adquireixen un sentit global quan les posem en comú i les fem dialogar.

En ocasió del 160è aniversari de la seva fundació, el Col·legi Sant Miquel dels Sants recull en aquest llibre un conjunt de mirades sobre educació. Mirades institucionals, mirades de la comunitat i mirades de persones especialitzades en educació que reflexionen sobre el seu futur, cadascú en la seva llengua. És per això que l'hem titulat Mirades, amb l'enriquiment del plural, perquè estem segurs que el futur encara serà més divers. I hi hem afegit en el títol "L'educació com a futur" perquè estem convençuts que l'educació millora el món.

Centrades en l'educació i amb el món com a marc, les mirades d'aquest llibre combinen la perspectiva local amb la internacional. D'aquí que en aquesta publicació hi han col·laborat especialistes d'Universitats i Centres d'Investigació de Catalunya, Galícia, Espanya, Itàlia, Argentina, Dinamarca, Finlàndia, Estats Units i Turquia. A tots ells, i a les seves institucions, els agraïm la seva amable col·laboració, així com ens complau poder-hi reproduir també l'opinió d'alumnat, de famílies, de docents i de persones de la nostra escola sobre el que esperen de l'educació.

Tenim l'esperança i el compromís de fer un món millor. Sabem que l'esperança arrela en la voluntat de cadascun de nosaltres, en la confiança en els altres i en el treball de tots plegats.

## MIRADES (LOOKS) – EDUCATION AS THE FUTURE

Retrospective, sincere, optimistic, honest, committed, passionate, human, cautious, creative, critical, ingenuous, experimental, close, complex, daring, reflexive and vital. Mirades or Looks is a collection of ways of seeing education from different perspectives and places in the world. These are looks or opinions that originate from the individual but which acquire a global sense when we put them all together and they interact.

To celebrate the 160th anniversary of its foundation, Col·legi Sant Miquel dels Sants has put together in this book a collection of opinions on education. These are institutional opinions, opinions from the community and opinions from people who are specialised in education, that reflect on its future, each one in their own language. That's the reason we have called it Mirades, with the richness of the plural, because we are sure that the future will be even more diverse. 'Education as the future' has been added to the title because we are convinced that education makes the world a better place.

Centred on education and the world as a whole, the opinions in this book combine local and international perspectives. Specialists in education from universities and centres of investigation in Catalonia, Galicia, Spain, Italy, Argentina, Denmark, Finland, the United States and Turkey have all collaborated in the creation of this book. To all of them and their respective institutions, we are extremely grateful for their kind-hearted involvement, and are honoured that we can also convey the opinions of students, families, teachers and others connected to the school on what they expect from education.

All this being said, we have hope and the commitment to create a better world. We know this hope is based on the willingness of every one of us, in the confidence we have in others and in hard collective work.

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Although I am not a futurist, I think everyone in education is involved in an endeavor that should regularly look ahead to the horizon of what our youth will face in the future. Trying to predict specific events in the future is a fool's errand, but if we learn from history and evaluate current trends, we can make some reasonably accurate guesses about what things may look like 5, 10 or maybe even 20 years into the future. Throughout this chapter, I'll make some general predictions about what I think our kids need to learn and what educators need to keep up with the changes ahead. Please feel free to contact me in a few years to tell me I'm wrong!

A common adage in the US, and maybe more widely, is that education is slow to adapt to change. This plays out in all parts of formal education – the design of learning environments, instructional styles, content coverage, teacher preparation, stakeholder expectations and many other areas. One way to view this is that this inertia, or resistance to change, helps to keep education steady and prevent issues created by frequent changes in direction. An alternative viewpoint is that this inertia makes it very challenging to adjust course when changes are needed. One issue here is that education does not operate in a vacuum. In the rest of life, change is constant. In a world where advances in technology are driving changes at what seems to be a faster pace each year, the inertia of education to remain like it was the year before or 5, 10 or 50 years before that is, in my view, problematic.

I used to be a middle school science teacher. Now I work at a university to prepare future science teachers. We do a lot of research on STEM (science, technology, engineering and mathematics) and on making. I also oversee a makerspace and a maker van at our School of Education.

For the last 15 years, I have been researching how people get interested in

## THE FUTURE OF EDUCATION

**Adam V. Maltese**

Professor of Science Education  
Martha Lea and Bill Armstrong  
Chair in Teacher Education

Director, MILL Makerspace +  
Uplands Maker Mobile

School of Education  
Indiana University – Bloomington

Quines són les tres coses que més m'agraden de l'escola?

**El pati,  
que és molt gran, i jugar-hi a futbol.**

Roger.  
elpetitmiquel

STEM. In one project, called Making STEM Pathways, we were looking at how engineers, computer scientists and other STEM professionals originally got interested in these subjects as young children and how that interest continued beyond that initial spark. One of the things we were looking at was trying to understand the role that making and tinkering played in the development of their interest. We learned that many of those STEM professionals talked about the role of failure and that they never got a chance to fail when they were younger children. They only ever got that chance to fail when they were professionals or maybe in graduate school. Since then we spent a lot of time thinking about how important this is and whether we can change that in education. This insight about failure also led to other projects where we're looking at what happens when kids fail while they're making. We are also looking at the role of educators in causing these situations and how their responses may increase or decrease the resilience and persistence of their students.

Going beyond STEM interest to learn more about the role of making and failure in learning pushed me to think more about the real goals we have when educating our youth. Pondering this led me to see that for many places in the world there exists something I'll call "conventional educational dogma." This dogma is a story that parents pass on to their children. I'll outline the steps, with the first being that young students should go to school. From early school they might go into higher education or directly into the workforce. For those who go into higher education they will eventually find their way into employment. Employment leads to earning money and money leads to stability and happiness. Many also believe and share implicitly or explicitly that the better a young person does in school the more likely they are to end up with the best jobs that lead to more income and greater happiness.

As I met people from various places and walks of life I realized that this type of belief about the importance of education seems to be apolitical and exists across the globe. I don't fully disagree with this dogma, but I have wondered in what situations, for whom and to what degree does this prove to be true. At the same time, I was first thinking about this I also happened to be traveling a lot for work and talking to others in education from different countries. To find out more about these countries I engaged in a bit

Quines són les tres coses que m'il·lusionen del meu futur?

**M'il·lusiona arribar a ser una persona  
capaç d'aportar el meu gra de sorra a la  
societat.**

Bruna. estudiant

of Googling to find relevant learning standards and other education policy documents. I can't say this is exciting reading, but what soon caught my attention was that, when countries articulated their vision for the future, the rhetoric was very similar.

In almost all cases, the documents included some version of the following logic. The current and future economic success of a country are tied to innovation. Next is that innovation is based primarily on people and companies involved in STEM-related industry, research and development. Following from this, it is critical to improve STEM education, which they seek to achieve through making these topics more rigorous in school. By rigor, my sense is that they often mean that students should know more content and engage with more challenging topics at earlier ages. In reading these I kept thinking – we already know: a) that we ask teachers to cover too much (in all subjects), and that b) when educators are required to cover lots of material the way they achieve this is most often through direct/didactic instructional approaches. And so this logic is something I'd like to challenge – the idea that rigor will lead to better STEM and better innovation.

I assume if you're reading this book, you often hear statements like “when today's six year-olds enter the workforce, a large percentage of the jobs that they will enter have not even been invented yet.” If this is true, then it seems that if we educate in the traditional way, we're setting them up for failure. Instead, I think we need to create educational systems that lead to more flexible and more innovative thinking. To be blunt, I will say that our current form of schooling cannot really lead to innovation. It often leads to good test performance, but it does not lead to developing innovative capacities.

This claim should lead to at least two questions: 1) if this is true, how do we have so much innovation in the world? and 2) what is better than the current model?

To the first question, I cannot claim that we have no innovation in the world. However, I now firmly believe that much of this innovation happens despite the schooling that most youth receive rather than because of that education. In my mind, most schooling privileges standardization

Quines són les tres coses de la meva feina que em satisfan més?

**Saber i aprendre  
a adaptar-me a  
noves situacions  
i realitats.**

Marta. docent

over divergent or creative thought. By standardization I mean that we want schools and teachers generally covering the same topics and performance is usually measured on how accurately students repeat facts back to the instructor or how well they can compute an answer using known algorithms. I would not classify myself as an expert in invention and innovation, but what I have learned about these outcomes is that rarely are discoveries or innovations made by doing the same thing thousands of times. Instead, we often credit purely creative thought, divergent thinking, coming at the problem as an outsider with fresh perspective, or even errors and mistakes with playing a key role in innovation. Therefore, I think that much of the creative thought and innovative capacity individuals possess is developed outside of school walls. I'd go further to say that we would have even MORE innovation in our world if our schools operated differently.

To the second question, there are a couple different ways that have been shown to help develop skills and the propensity toward developing innovative thinking in students. The most common approach is through inquiry instruction. Related to this, there is benefit to engaging youth in practices that are authentic to a range of disciplines. Next, although it is often discouraged in formal schooling, engaging children (and adults too) in play has been shown to lead to creative thinking. Finally, I am a believer that engaging learners in making and creative practices can achieve these goals too. Since there are volumes written on inquiry, engaging in authentic practices and play, I will focus here on making.

While the current version of making that we talk about in relation to education may involve new technologies, humans have been making for 2.6 million years. In the US, making, in the form of Home Economics and Shop Class, fell out of favor for a while, but as with many things, we're in a cycle now where educators see value in getting kids to use their hands to make and create. However, the current version is somewhat different than its predecessors in at least three key ways. First, there is a large infusion of newer technologies that are often associated with making, including 3D printers, laser cutters, CNC mills and others. Second, making in education is often part of other classes rather than a stand-alone class. This means that no specific group of educators "owns" making and there is much more integration of these practices into the subjects commonly taught in scho-

Quines són les tres coses de la meva feina que em satisfan més?

**Transmetre coneixement i aprendre constantment de l'alumnat.**

Joan. docent

ols. Third, whereas shop class suffered from the stereotype that it was for kids who were not on the academic track, making is often available more broadly. Now, these statements are generalities and exceptions abound, but I wanted to provide some sense of the differences in these educational modalities. To summarize – making is a new approach that is rooted in older, even ancient approaches, but also some elements that make it unique and worthy of attention.

Although I just said that making is often associated with new technologies or high-tech spaces, I want to make it clear that in my mind making is not about “space” or the “stuff”. A makerspace, by itself, doesn’t do anything. More importantly, it’s critical to realize that excellent maker education can (and does) happen without fancy tools or space. Over the last few years, I have worked with colleagues to provide training to hundreds of educators about making. A simple way we have come to think about this is: making is not what to teach (content) and it’s not where to teach (space), but it’s a different way to teach.

Why is it worth us talking about making here and why do I think it addresses some of the needs expressed earlier? Making is often student-centered and focuses on local problems that have relevance and authenticity for the learners, which brings a number of benefits. First, each learner can be an individual and represent themselves as an individual. Inherently, making also allows for exploration. This exploration can follow the whims of the learner or be more guided by the instructor but it is not likely that all learners will explore the same ideas in the same ways. This exploration allows individuality and learners to follow their curiosities and create things that are their solution to a given challenge or problem. Through this exploration and creation, learners will experience failure. In embracing these experiences educators can help children to understand that failure is part of problem solving, part of the design process, part of creation and generally part of learning challenging things. Another benefit from all of this is that making frequently generates an expression that individuals get when they see something that they had in their mind come out in front of them. It might be 3D printed or sewn or a world they created in Minecraft, but the look is unmistakable as an expression of joy and pride. For educators, this look is addictive. As soon as you see this in your learners, you want to see it

Equines són les tres coses que  
m'illusionen del meu futur?

**Provocar canvis  
socials per a viure  
en un món sense  
discriminacions  
de gènere, raça o  
d'orientació sexual.**

Júlia. estudiant

over and over again. I think this comes from the personal exploration and, unfortunately, it is something rarely seen in classrooms that focus on rote learning. While joy and pride are great outcomes, educators often say that when students have these experiences they feel more independence, efficacy and empowerment and as a result are more likely to push themselves further and take on greater challenge to make improvements or in future work – and so it is a virtuous cycle.

We need to also think about how we adjust schools and schooling to address these changes, While there are myriad shifts needed for all of this to work well, I will focus here on a few changes that I think are most salient. These changes are associated with how we prepare teachers, what content teachers should teach, how teachers teach (discussed above), and how we evaluate learning. It is imperative that we make changes in all of these aspects in order to drive changes in student outcomes.

I will touch on each of these ideas in turn. First, if we think of the preparation of new teachers, those of us who prepare future teachers need to find better ways to get these pre-service teachers (PSTs) practice and experience in working with youth. This increased experience should improve their comfort level as instructors and their ability to be dynamic in the classroom and modify instruction to support learners who might be exploring a diverse range of topics and approaches. In my experience, many teacher educators are doing what they can to encourage PSTs to understand and think about how they can provide their future students with choice and voice. Most teacher educators include a variety of inquiry-based approaches that are very much in line with what we think is best for developing these problem-solving skills in learners. That is a great foundation, but we need to build on that foundation to get pre-service teachers to feel more confident in how to implement these approaches. One conclusion I have drawn over my years in this role is that many of our PSTs are unfamiliar and even afraid of inquiry-based instruction. I was puzzled when I first encountered this, but now I am quite confident that this is mostly because they never experienced this type of instruction themselves. With this lack of experience, it is an unfamiliar mode of instruction and they lack a readily accessible mental model of what this should look like. Because of this, we cannot simply tell them this is the right way to teach - we need to give

Quines són les tres coses de la meva feina que em satisfan més?

## Veure l'aprenentatge i el progrés dels estudiants.

Isabel. docent

them extensive experience in teaching with these methods. I use methods here because it is important, in my mind, to understand that inquiry-based instruction is not a single approach, but a collection of varied approaches that give students a range of choices in the topics that they are investigating, how they are investigating those topics, and how they are going to demonstrate their learning of those topics.

There are a number of different approaches in teacher preparation programs that work toward getting pre-service teachers experience with learners. Whatever the style of approach. I am a strong believer that we need to encourage more of this practice to occur in order to give teachers adequate chances to try out the methods we are telling them they should employ. One approach that we have been working on lately is the use of a virtual reality environment to mimic classroom interactions for elementary and middle school settings. While there is still a lot of work to be done with our simulator, there is very good potential with this approach for providing a supplement to PSTs that gives them more experience practicing the instructional approaches we are encouraging them to use. Our main goal with VTS is to provide a context that is authentic enough that PSTs are able to implement instructional methods and practice them repeatedly to gain comfort in their use. As teacher educators, VTS gives us the opportunity for providing synchronous or asynchronous feedback to the instructors with the goal of continual improvement. With further development coming, we are confident that VTS can provide a range of educational contexts that support the learning of PSTs.

We plan to use artificial intelligence to improve the authentic nature of the classroom in a few ways. First, the incorporation of AI will allow us to create scenarios in the virtual space that include naturalistic variability so that although the contexts may look and feel similar each experience can be set up to be unique, much like real classrooms. One of the things that we are most excited about involves building in learner characteristics. such that each student avatar in VTS speaks, responds and behaves in certain ways. This might include the incorporation of various challenges or exceptionalities that each learner faces and common idiosyncrasies that all learners bring to the classroom. Overall, we feel that increasing the amount of practice and feedback that PSTs receive, particularly when they are able

Quines són les tres coses que espero de l'educació?

**Millorar l'autonomia, el  
saber-se espavilar en un món  
canviant.**

Xavier. pare

to practice inquiry-based instruction methods, should lead to new teachers entering the classroom with significantly more hours of practical experience working in front of learners - be they real or virtual.

Another change that is needed is to adjust the expectations for what content students need to learn and what content educators need to incorporate into their instruction. This is not a simple topic and is the focus of years and years of writings, editorials, research papers and debate. I will not get deep into that conversation here, however, I think there are a few general things that we should encourage and support that can help create a more positive environment for fostering the development of problem-solving skills in youth. One topic that frequently comes up when discussing content is academic standards. Commonly, when we start discussing with educators how they can be more innovative in their practices, they lament that if they had fewer topics to teach they would be able to dig into those topics in a more engaging way and work to develop deeper understanding of those topics. It seems universal that we ask teachers to try to accomplish too many tasks and cover too much content. What this inevitably leads to is often shallow learning of a variety of facts without encouraging critical thinking and application of the concepts we are introducing to students.

If we are looking to increase the applicability of content and integration of topics to reflect what students will see out in the real world, this needs to be reflected in assessments too. We regularly talk about the importance of integrating STEM topics rather than leaving these concepts siloed. If we agree with this, then we also need to assess STEM in an integrated way. This might involve an examination where students are conducting work that requires them to leverage science content, to engage in mathematical thinking, to think about the engineering design process and other related ideas all while explaining how they would solve a problem in their community. Additionally, this integration should go beyond linking adjacent content 'peers' (e.g., math and science) to include subjects from the arts, literature, foreign language, social studies and history, and others. This seems like it would more truly capture learning in the areas that we think are valuable for students to learn and to engage in real-world problems they will face when they graduate. Beyond making adjustments to classroom assessment, an equally important challenge will be changing the content

and format of standardized assessments. This will be a major task but is an essential component that is often pointed to as a barrier to the shifts I've discussed in this chapter.

Here I tried to present my view of the 'future of education' and how we really need to make changes if we want it to better prepare youth for solving all of the problems we are leaving them. Although I am frustrated that the system that has lasted for generations is not better at meeting the needs of our youth, I know it came about at a different time. I also understand that few of the changes I describe here are simple. Instead, most of these will require large forces, including significant time and money to address the inertia of the education system. Despite this inertia, I think changes are needed to help our youth.

Quines són les tres coses de la meva feina que em satisfan més?

**Fomentar la capacitat d'adaptació, ser polivalent, reciclar-se formativament i aprendre constantment.**

Patrick. docent

