

# WHY GUE

– GUE's approach to education m





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PHOTOS **BORI BENNETT, ULRIK JUUL CHRISTENSEN & DOROTA CZERNY**

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PHOTO **BORI BENNETT**

**Ulrik Juul Christensen, a renowned Danish MD, serial entrepreneur, and education specialist, has had a remarkably successful career in codifying how humans learn and developing learning technology. Besides his professional achievements, he is also an avid diver. Recently, he had the opportunity to participate in GUE classes and work with GUE education teams. In this reflection, he describes his GUE experience and shares his thoughts on GUE's training methodology.**







Ulrik Juul Christensen  
polishing his valve drill  
skills on a dive in Bonaire.

**In** February 2014, on a bitterly cold evening in Boston, after eight months of intense negotiations, my team and I were selling our company—the company that had solved one of the most complex problems in education: How to use computers intelligently to help learners learn on their own. It was a bittersweet moment because this was a business that I had built with my dear friends over the previous eight years. Many of us, in fact, had worked together since the early 90s when we built the software for the first advanced patient simulators. Together we had also built the first technologies to allow computers to intelligently debrief learners after simulated scenarios. In many ways, this had been the first-generation personalized learning technologies. We then made the second and third generations of adaptive and personalized learning at McGraw Hill while retaining the core infrastructure that we used four years later to make the fourth-generation platforms for multidimensional learning, including skills and character development. All our work had been based on research into why people fail to perform in various situations—more importantly, research in and development of methods of learning that actually work.

### **Multidimensional learning**

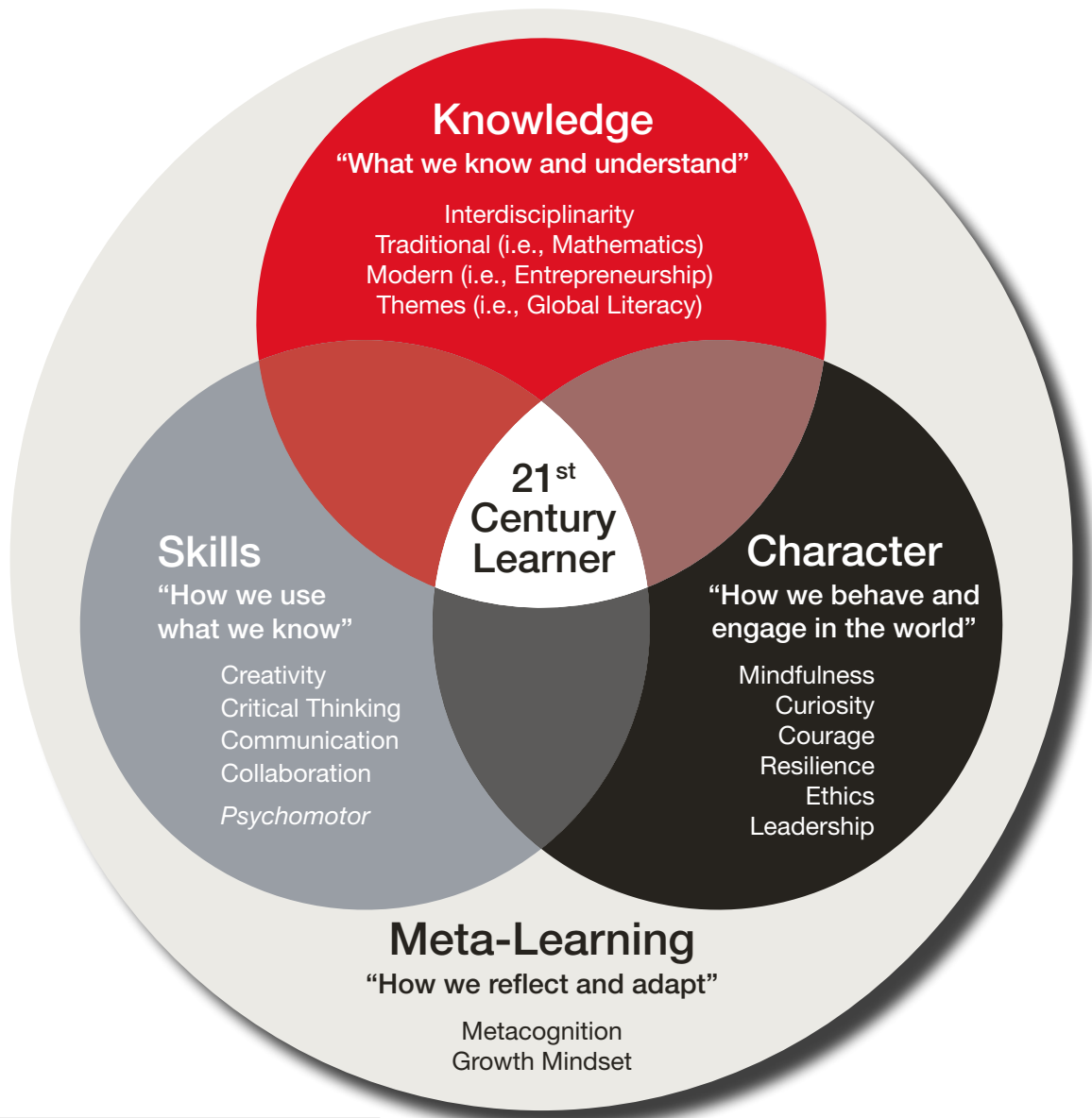
Instead of celebrating the transaction, my wife and I had a quiet dinner with Professor Nader Rifai—my wife’s new boss at Boston Children’s Hospital and Harvard Medical School. Together we were going to start a project that my colleagues at McGraw Hill and I had deemed impossible. Rifai’s dedication to solving an unsolvable educational challenge was why we moved to Boston. He was one of the most influential people in laboratory medicine. As the editor-in-chief of the high-impact journal *Clinical Chemistry* and the lead author of the textbook bible of laboratory medicine, Tietz, Rifai already had a powerful platform to change how people in laboratory medicine learn. Eight years later, we had accomplished the mission. In 2023, more than 110 top experts in the world have contributed to one of the largest de novo development projects in education.

Together with the rest of the team, we had effectively found a way to reduce the time to achieve proficiency and to secure better long-term retention. The technology and approach are the backbones of some of the largest and most critical education programs. The American Heart Association certifies millions of health-care professionals and emergency personnel yearly using these methods. Emergency care is an excellent example of a critically important

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Education curricula must adapt to the demands of a modern world by modernizing the four dimensions of Knowledge, Skills, Character, and Meta-Learning. This ensures learners are equipped with the necessary tools to succeed.

phenomenon: It is not just knowledge or skills. The most powerful learning environments are profoundly multidimensional. The four-dimensional learning model developed by the Center for Curriculum Redesign provides a simple overview of the relevant dimensions.

### **Diving as a learning lab**

How does all this relate to diving and the world of Global Underwater Explorers? For context, at the time I was introduced to GUE, my family and I had been diving for around twelve years. My wife and I are both avid dive instructors and technical and CCR divers. Both of our grown daughters are divemasters with several hundred dives. Because diving is such a potpourri of skills, knowledge, and character development, I also use diving as a petri dish for learning experimentation and R&D. Together with my R&D team at Area9 Lyceum, I have developed several groundbreaking technologies based on my research project on how to learn fish identification. This led to technologies that are not specific to diving and are integrated into all our products today.

Area9's reputation with some of the largest learning players (US Army, The American Heart Association, NEJM Group—just to mention a few) earned me access to the leadership of the two largest diving certification agencies. Even though we bring commercial experience in terms of improving learning outcomes and financials for our partners, I have to date failed to convince any of them that learning science, learning engineering, and cutting-edge learning technology should be part of their future.

### **Hospitality**

In July 2021, my family and I had been on Bonaire only a few days when we met Mr. G, GUE instructor and the manager of the tech department at Buddy Dive. I had taught my 71-year-old father to dive earlier that summer, and I was excited to explore Bonaire for the first time and continue this unique journey with him. We expected to only pick up supplies, but Mr. G's attitude struck me. The Colombian with the long gray ponytail suggested, "Why don't we find a classroom and sit down to discuss your plans

PHOTO ULRIK JUUL CHRISTENSEN



During their visit to Bonaire, Mr. G convincingly introduced Ulrik and his family to GUE's approach.

for the next two weeks?" We spent more than an hour. When we had identified easy dive spots for my father's weak knee, Mr. G asked, "Why not dive here, from Buddy Dive?" This invitation was partly due to the general hospitality of Bonaire, and of Buddy Dive in particular. More importantly, this was a small glimpse into something central to GUE: profound engagement with and commitment to the people around you. In fact, the atmosphere Mr. G created and the engagement and enthusiasm he exuded were like nothing I had ever experienced during my entire diving life at that point.

### **Best learning experience**

The next day, we were waiting on the *My Buddy* dive boat. Our CCRs were ready to go, and the proud Colombian with the ponytail came walking up with his odd-looking rebreather—valves up and everything. In the water, it was clear that Mr. G was an excellent diver. After having





studied the power of deliberate learning and the value of debriefings for more than two decades, I have made it a habit when diving—or otherwise working—with great people to at least ask, “What can we do better next time?” Mr. G usually answered that things were great and that we were great divers. However, after a few days, he asked softly, “Why do you use those big carabiners?” We had picked up that habit in Costa Rica, where we were often diving in bad visibility. The carabiners generated a lot of noise, and Mr. G told us why cave divers don’t like them and that they are called suicide hooks. This was the first of many small nuggets of wisdom we received before my wife and I took the GUE Fundamentals course a year later. That course was, beyond any doubt, one of the best learning experiences I have ever had. I later learned that while I think the world of Mr. G—to the extent that I have invested a small fortune in our new tech diving support and learning research center in

Bonaire—he is not alone. In fact, he represents a community of GUE instructors with similar characteristics, and this is not a coincidence. I will come back to what I believe GUE is doing differently. Let’s first talk about the why.

### The why

In the fall of 2022, I interviewed Jarrod Jablonski about the origin of GUE and of his journey to this most impressive learning engineering. The interview was for a book about “learning that works”—or “mastery” learning—that I am writing with my good friend and best-selling author, Tony Wagner. I have studied high-performance, high-reliability training environments for my entire career, and there is a direct correlation between how likely you or somebody close to you is to die and the quality of the learning engineering. Jablonski’s story confirmed that. The formative period of cave and exploration diving represents a stark contrast between the inherent





Dry runs improve muscle memory. This builds neural pathways for instinctive performance.

risks involved and the conscious decision not to engage in an activity as potentially hazardous as extreme diving.

It is different from the risks involved in surgeries. Surgery is often imperative, and the benefit is immediately obvious. I attended medical school during the conflict between the Bosnian Serb military forces and the United Nations Protection Force, including Danish combat units. Soldiers would present with severe injuries after explosions, injuries for which there were no surgical procedures validated by double-blinded, randomized controlled studies. There were no alternatives to innovative surgical solutions on the spot because the consequences of doing nothing outweighs the risks involved.

I am perfectly aware that many in the GUE community consider cave and exploration diving

an imperative, although we can probably agree that it is a choice. This is likely the reason why GUE training is one of the most stellar examples of integrating learning science. In the early days of aviation and the training of pilots, there

was a similar period of safety and dedication to education. Many of the methods and much of the science used in GUE, as well as healthcare and other high-performance, high-reliability environments, comes from aviation. My recent experience and research

indicate that as aviation has gotten safer, aviation has also gotten somewhat complacent and maybe has not evolved as fast as it could have, or maybe not at all.

### Core concepts

The second reason why I think that GUE has been more assertive in adaptive learning sci-

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ence and has engineered an impressive approach to learning is the inherent team aspect of exploration diving. It has predominantly been a team effort from the beginning of the modern era of exploration diving. Hence, there is an imperative to implement methods from team research and to groom healthy team cultures and character traits.

So what is it that makes the GUE education stand out so much? I have had the privilege of several months of work with GUE education teams to discuss and architect the education of the future. That has further confirmed my preliminary understanding of what GUE is doing that is profoundly different from almost any other organization I have come across. I believe that it can be distilled into four core concepts that characterize GUE's education:

1. It is truly mastery-based
2. It is team-based
3. It is multidimensional and based on a deep understanding of human factors
4. It is agile

## **Mastery and team**

The first thing that stands out when you take part in a GUE course is that it is truly mastery-based. You are not taking your mask off only once while kneeling on the bottom. You must learn all skills, including taking your mask off, while neutrally buoyant and not moving in the water. You must learn a skill like this to the level of automaticity—or mastery—so you can do it while both back-kicking and also monitoring your depth. This approach transpires through all the further training and learning and is a crisp contrast to the frequent sight of a new diver who finally takes their mask off under great drama to finalize their open water certification. I like to explain mastery-based learning as learning that works. GUE's educational approach is extraordinary in this respect.

The second thing that caused my jaw to drop was when my Fundamentals instructor explained that not only was it permitted to get help doing a skill from your buddy, but it was even encouraged. Talk about taking team training to the next level! Every man and his dog in

PHOTO **BORI BENNETT**



Team-based learning is supported by studies showing that helping others can lead to better retention and improved performance.



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**“ Learning to work as a team while learning is not diluting the final mastery. In fact, the learning might take place at a much deeper level. A recent study showed that helping others significantly improves the mentor’s own performance.**

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the traditional educational world would freak out over the risk that with teammate assistance, you might not know if a Fundamentals student really can do something well enough. To me this is a brilliant example of how to get the person helping to shape situational awareness and team skills. GUE is already protected against the potential weak performance standards through the mastery-based approach, so this is a small stroke of a genius in my opinion. Learning to work as a team while learning is not diluting the final mastery. In fact, the learning might take place at a much deeper level. A recent study showed that helping others significantly improves the mentor’s own performance. This example is just one of many instances of GUE’s pervasive appreciation of the importance of human factors. It is central from prejump monitoring of each other’s gear and minimum gas calculations for the team (not for you personally) to the more designated situational awareness training.

### **Human factors and agility**

I have built thousands of training programs over more than two decades. The human factors approach at GUE is present at all levels. I have been working with GUE and the teams designing the next generation of educational programs for less than a year, but the dedication to personal character building, continuous learning, and constructive discourse is truly impressive.

The final point that I want to highlight is more tacit in the GUE community’s identity. The value of this trait is most likely vastly undervalued, but only because I believe that the contribution of such an amazing educational program has been monumental. This trait is agility. I appreciate that there is a long history with many conflicts of opinions and dogmatic fights. I believe that one of the most important treasures that GUE is harboring is agility. However, this is diametrically opposed to many outsiders’ views of GUE-trained divers and instructors, including ones that I have met around the world.

GUE has often been portrayed as dogmatic—almost to the level of religious zeal—about diving safely: the gear, team diving, gas mixes, and the no-smoking edict. I disagree with this portrayal. I have personally worked on hundreds of higher education programs, many where there was no real justification for why a particular thing was included in the curriculum ahead of something else. In my experience working with the GUE educational designers, I have found that an impressive percentage of the GUE curricula is rock solid in these justifications of why. Most importantly, if we get to something for which there is no good explanation, the willingness to change to something we can justify is simply off the charts. The contrast between the outside world’s perception of GUE and the reality of it—where there truly are no holy cows—is almost absurd.■

Ulrik remembers his Fundamentals course with Mr. G as one of the best learning experiences he ever had.



PHOTO **ULRIK JUUL CHRISTENSEN**



**Ulrik Juul Christensen**

Ulrik Juul Christensen is a Danish entrepreneur, educator, avid scuba diver, CCR diver, underwater photographer, and instructor. He is the CEO of Area9 Lyceum, which has been pioneering personalized learning platforms that use adaptive technology to shape learning to individual learners. With his background as a medical doctor, he has spent three decades in human

factors, simulation, and debriefing research as well as high impact/high stakes learning. More than 50 million learners from middle school to physicians have been using Area9's platforms. Christensen serves on the boards of several companies and organizations, including the Technical University of Denmark (DTU).

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