TECHNOLOGICAL ADVANCEMENTS

IN POOL MAINTENANCE

BY DAVID VINSON, PHD

A swimming pool: crystalline and cool, a place of refuge where one can wade and unwind, splash around and be silly, or experience a full-body exercise in comfort. For prospective college students, a swimming pool is a major campus attraction, not simply due to the dynamic possibilities of a pool's design and functionality, but also for what it represents as a social and restorative space. Moreover, aspiring high school swimmers who dream of competing at the college level are likely to focus on available aquatic facilities even prior to checking out the dorms. For these reasons, we're seeing a nationwide trend of investments in aquatic facilities—they are and will remain a terrific recruitment and retention tool.

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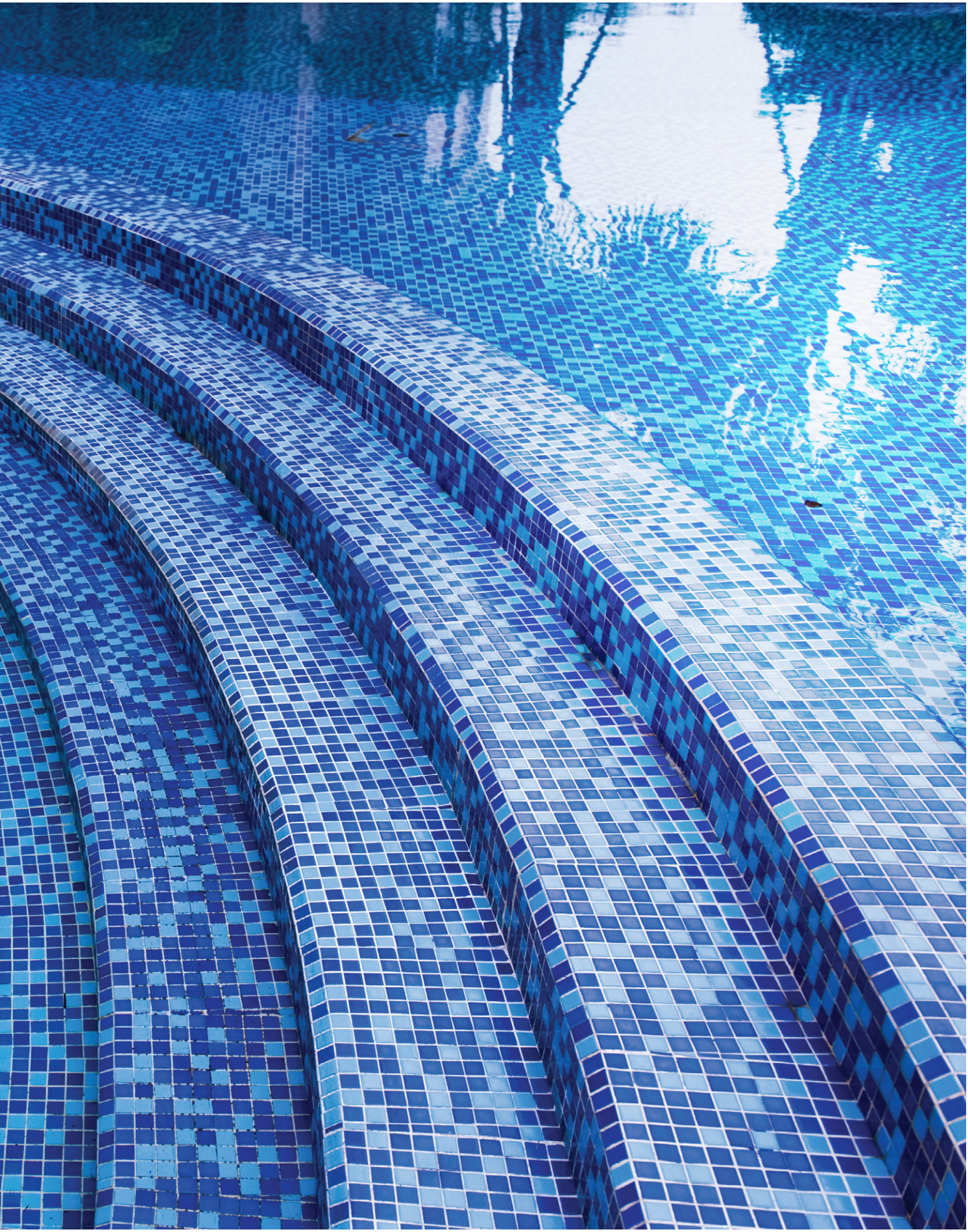

Just as technological advancements are transforming the classroom with innovative means of disseminating shared and applied knowledge, swimming pools are swiftly becoming spaces transformed by technology, as well. Perhaps this is counterintuitive in some ways given the old model of a hole in the ground that is paved with concrete and pumped full of water. The evolution of what a swimming pool can offer and how it can be maintained is a testament to precisely what technological innovation provides. In fact, smart pool monitoring systems are now one of the most significant innovations in pool maintenance. These systems use sensors and other advanced technologies to monitor different components of pool water quality, such as pH and chlorine levels, in addition to water temperature. All is managed with a click on a smartphone. Monitoring systems also notify maintenance personnel when issues with water quality occur. Some smart pool monitoring systems can even be synced with other smart devices, enabling control of the pool's settings remotely.

Automated pool cleaners are hardly new, and yet recent technological advances have made them more efficient and effective than ever. Consider, for instance, robot pool cleaners. They are small, wheeled machines that use advanced algorithms to navigate and clean. They can even crawl up and down the walls of the pool. An electric motor creates suction to remove dirt and debris, placing the detritus in a catchment. Equipped with low voltage motors, robotic cleaners are particularly reliable for long-term use. Some models include a built-in sensor that can detect the shape and size of the pool, which optimizes cleaning patterns for maximum efficiency. Chemical dosing systems are also more efficient. Guessing the needed amount of liquid pool chemicals is an obsolete issue thanks to systems that automatically dispense the accurate amount of chemicals, including chlorine and pH adjusters. Such systems ensure that the water remains balanced and free of contaminants without the need for constant monitoring and adjustment.

Ultraviolet (UV-C) water treatment is a technology that uses ultraviolet light to disinfect pool water. The technology is highly effective in killing bacteria and other harmful pathogens, making it an ideal swimming pool acid alternative. UV-C water treatment also reduces the amount of chlorine needed in the pool, a welcome benefit to those who are sensitive to chlorine or prefer a more natural approach to pool maintenance. Saltwater chlorinators are another technological option. Rather than using traditional chlorine tablets or liquid, saltwater chlorinators generate chlorine from salt that's then added to the water. The result is a more natural and gentle approach to pool disinfection, one void of harsher chemicals. This form of chlorination can also reduce the need for regular manual cleanings because it helps to prevent the buildup of algae and other contaminants. An organic carbon dioxide (CO2) water system is likewise designed to reduce the amount of chemicals for water treatment and is considered an eco-friendlier swimming pool acid alternative. In an organic CO2 system, small amounts of carbon dioxide gas are injected into the pool water, creating a natural acid to help regulate the pH levels of water for safer and more comfortable use of the pool. An organic CO2 system is fully automated,

and its sophisticated control panel regulates the flow of CO2 gas into the water, ensuring that pH levels remain stable.

Recruiting with Innovative Leisure Pools

According to a study ten years ago from NIRSA (known otherwise as Leaders in Collegiate Recreation), ninety-two schools in higher education reported over $1.7 billion in capital projects. This staggering investment has only grown. When students are polled regarding their wishes for campus improvements, their responses are enthusiastically recreation-based. Aquatics is central to this mission, and we are seeing stunning, creative designs that would stand out at any luxury destination. From a pool designed as a "lazy river" to a 20-foot wet climbing wall that empties into a deep oasis, innovations in aquatics are pushing the limits of imagination. Universities are now home to zip lines where students can ride over water, recessed fireplaces in the middle of pools, and "rain gardens" that mist lounging students. Even the most innovative classrooms may look alike, but pools are an immediate attention-grabber for prospective students. Imagine the lasting impression made when prospective students encounter palm trees in an indoor beach club on campus; a pool patterned in the shape of a university mascot; hydrotherapy jet streams and equipment for water basketball and volleyball; 25-yard lap swimming lanes with color-changing LED lights and a 100-foot projection screen for film viewing as one takes a dip in the water; or, as if on the beach, a pool with zero depth-entry that leads into a current channel designed for relaxing or for a more challenging resistance swim.

Competitive Aquatics and Recruitment

The U.S. College sports system represents a unique opportunity for competitive

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swimmers to combine a first-class university education with training and competing in the nation's best sports facilities. With approximately 550 swimming programs available at the university level, recruitment translates to big business. Aquatics facilities are central to this process and are tailored to the program's competitive priorities. A prospective student-athlete who excels in one specific swimming event—for instance, the 100m Freestyle—will understandably pay careful attention not only to the culture within the program but to the diversity of facilities offered. A similar logic applies to a student-athlete who is competitive across the board in multiple events.

A novice to the sport is unlikely to correlate aquatics design with having a competitive advantage, but this factor is noteworthy for competitive swimmers. Pools can be designed to achieve the fastest times during training and competitions—the depth of water, the wide tracks, and the water flow control system all ensure a minimization of waves. Indeed, the water—and the athletes' ability to move through it—remains the most essential part of competitive aquatics events. Traditional pools are 25 or 50 yards in length, with 6, 8, or 10 lanes for racing. Every aspect of the pool itself makes a difference as competitors seek fast times. Perhaps it sounds strange to say that a pool can be fast, but its construction and design makes a difference. For instance, if one has the capacity to accommodate three lane lines between each lane, that makes the pool faster due to less wave action. Further, gutter systems where the water flies into the gutter and doesn't push back at the swimmers can facilitate faster movement. Details matter. USA Swimming requires water temperature between 77- and 82.4-degrees Fahrenheit for competition. In indoor facilities, the air temperature must be at least 76 degrees within eight feet above deck level; the relative humidity is about 60% and air velocity twenty-five feet per minute.

Larger pools require a means of separating the spaces to ensure each area is ready for competition. These structures are called bulkheads and are typically moveable to allow simultaneous events to take place without impacting one another. If a pool has a water polo area, diving well, or family-swim area, bulkheads can prove crucial in keeping an adjacent swim course wave-free for racing. Bulkheads can be installed in both current and new facilities. Because water polo in the U.S. is gaining prominence at the university level, many pools are built with the sport in mind. Water polo is played in roughly the same depth of water as swimming, not least of all because the depth limits waves and ensures no players can touch the bottom of the pool.

Accessibility, Safety, and Keeping Time

Competitive aquatics can draw sizeable crowds, especially at Ivy League schools where an impressive number of student-athletes go on to compete at national and Olympic events. For the fans, aquatics centers must

provide comfort and visibility in addition to adequate sound systems and lights. Any operator building a competitive facility must ensure there is enough deck space to accommodate every swimmer, official, timer, and fan at the event. Air circulation is a factor for comfort, as well, particularly for viewers seated in tall bleachers. Locker rooms and an appropriate number of restrooms are required by the ADA, as are wheelchair-accessible spaces. Of course, safety is a key priority at aquatics centers. Lifeguards need to be placed in appropriate areas to observe and enforce safety measures. Diving competitions require safety protocols such as non-slip platforms that provide a front edge flush with the end of the pool while also having no more than ten degrees of slope. The platforms must also be positioned between .5 meters and .85 meters above the surface of the water for short and long course pools.

Competitive pool technology has made no bigger strides than in timing systems. After decades of handheld timing susceptible to human error, many competitive events are now implementing automated touchpads that have taken the minutiae of swimming to another level. Once the swimmer hits the wall, the time is recorded. If USA Swimming is used as a guideline, touchpads should be placed in the center of each lane and at least two feet underneath the water's surface. The panels stop the timing system instantaneously by a light hand touch anywhere on the flat surface facing the racing course; moreover, the upper edge cannot be activated by water turbulence. Notable, too, are the vast improvements in where competitors' times are displayed. A good videoboard even ten years ago would cost three times the average board today. Now, a scoreboard is also capable of video technology that doesn't look pixelated from a distance.

Remarkably, aquatics technology has also led to underwater video, something every coach would wish for. Most coaches would agree that visual learning is performed best by watching oneself swim. Some companies have designed sophisticated software platforms to make it simple to share video between coaches and athletes. Some include a system of high-definition cameras with different mounting solutions, pool deck analysis software, customizable iPad app, along with a cloud-based storage system to provide coaches with all the data they could possibly need. Clearly, aquatics has entered a new realm of possibilities, and our students and broader communities are taking note.

ABOUT THE AUTHOR: Dr. David Vinson has a PhD in English with specializations in transatlantic literature and cultural studies. He is a committed scholar, teacher, and dad. If you ever meet David, avoid the subject of soccer. His fandom borders on the truly obnoxious.