# Simulation Environments



## Simulation Environments

Despite their proven advantages in science and engineering and their broad application in daily activities, such as financial planning, models and simulations have not been widely utilized in education, particularly in the K-12 environment. One of the main reasons is that simulations are reserved for expert use and have a steep learning curve for novices. Modeling and Simulation (M&S) provides untapped educational advantages such as exposing students to STEM concepts and skills in simulation design and simulation development among others. Yet, concerted efforts for creating awareness and educating students, parents and teachers on simulation modeling, such as code.org and scratchjr.org for computer programming, are difficult to find.

At VMASC, we are trying to bridge that gap on two fronts: developing simulation environments that are easy to use and by conducting STEM outreach.

Cloud-based Simulation Environment: If by using a browser we watch movies via Netflix or write documents via Microsoft 365, why don't we create simulations in the same manner? Cloud-computing is one of the technologies driving the 21 century. Yet, we run simulations relying on computers instead of mobile devices. Not only are we relying on old technology but by making it more complicated to the novice we are limiting access to a wide range of students and small businesses. Simulations environments don't need to be complicated. They can be easy to use and accessible the way non-experts want to access information today: anywhere and at any time. At VMASC we developed CLOUDES to make simulations accessible to the person that does not need a complicated tool. CLOUDES is one of the few web-based simulation environments where people can build and play with simulations and likely the first to be cloud-deployed. CLOUDES provides both the non-expert and expert the capability of creating discrete-event simulations anywhere, anytime. The tool has been successfully introduced to high school students and to undergraduate and graduate students at ODU.

## Cloudes

***CLOUDES: Rethinking How We Learn, Build and Play with Simulations***

Computer literacy and STEM (Science, Technology, Engineering, Math) Education are today at the forefront of educational efforts. They both have the potential of making people, young and old, participants of the ongoing technological revolution by opening the doors to entrepreneurship and well-remunerated jobs. Computer literacy is considered crucial as reflected by efforts such as those of code.org and scratch.org. . STEM, on the other hand, has been and will be the driving force behind ocean and space exploration, advanced manufacturing, robotics, biotechnology, and transportation to mention a few. One approach to getting that exposure to both is through modeling and simulation (M&S). M&S teaches students how to capture a real or imaginary system in a computer and ask questions about that system. M&S helps develop the ability to 1) meaningfully simplify a complex problem; 2) capture the problem in a model; 3) describe the model in a computer language, 4) collect meaningful input data; 5) execute the model over time; 6) obtain and analyze results and 7) make inferences about a potential solution to the problem. Further, models and simulations expose users to logic and statistics along of developing problem solving and analytical skills. In order to support the learning and the practicing of using and building simulations, VMASC developed CLOUDES. CLOUDES is an online environment where students can create, access, and share simulations. It is easy to use, accessible through mobile devices and no programming is needed.

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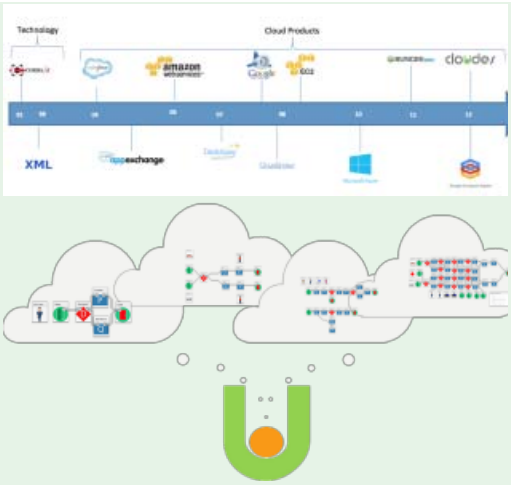






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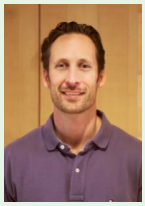


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