

Training Biomedical Laboratory Scientist Students for Future Challenges

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Biomedical laboratory scientists (BLS) across the world have spent the last decade adapting to an increasing number of emerging infectious diseases and technological advanced for new diagnostic tools. In 2015, global travelers were warned against Zika virus, and since then there have been back-to-back challenges like reoccurring Ebola outbreaks, measles spreading across Europe and the global corona pandemic combined with the recent monkey pox outbreak. The corona pandemic has given laboratories rapid access to advanced diagnostic methods and enforced safety procedures that differ from the routine procedures in the laboratory and are usually not included in most biomedical laboratory scientist educational programs.

Systematically learning with simulation as a pedagogical method could be one approach to include training outside routine procedures and is frequently used for training nurses and medical doctors. For instance, new cutting-edge surgery techniques are usually practiced with both virtual and physical simulations. Virtual simulators with high resolution and haptic feedback provide a good foundation for learning and failing in safe environments. Physical simulations allow groups of staff from different professions to train together to optimize patient care. Simulations tend to focus on training multiple skills simultaneously, such as performing a technical procedure while communicating with others, monitoring the work environment, and handling challenges that occur.

Looking at biomedical laboratory educations, students get a lot of practical training in laboratories and in hospitals, but learning outcomes focus on routine procedures and routine tasks. Some aspects of the profession are not allowed or even possible to include in the educational curriculum. This is where simulation can contribute into BLS education, to be able to include aspects of the profession that otherwise would be impossible to teach. Nurses and medical doctors use simulator manikins to learn e.g resuscitation, in similar ways that BLS could use manikins to draw blood. For more advanced training, virtual simulations can be used to test procedures for handling samples containing potential deadly viruses or highly contagious patients.

Roleplay is also a common simulation-based training method that BLS students could use for training on blood sampling from patients with contagious diseases, airborne infections and other similar situations that do not occur on a regular basis but require a different approach than the average routine sampling or analysis. Students can get new experiences from trying

to perform blood sampling in full protective gear or wearing protective gear while trying to analyse a sample in a level 2 safety bench without breaching security protocols. These aspects are rather easy to include in BLS curriculum.

Another important aspect of simulation-based training is the possibility to perform errors in procedures and be given the opportunity to reflect on why an error occurred and how to avoid that in the future. In addition, laboratory training in BLS education is usually in low stress environments with little or no disturbances, while hospital labs can be rather busy and noisy. Simulation methods often describe how to build layers into the training to include skills that BLS students could need later in their professional life. The different aspects of soft skills, like communication, self-awareness, cross disciplinary interactions, and reflection can help build resilience for BLS students and develop their professional identity. Simulation is also a good basis for lifelong learning.

Medicine and nursing education provides extensive literature that describes design, planning, execution, and performance. A literature search reveals that it is not as common to systematically use simulation as a pedagogical method for BLS students and disseminate the results or performance. However, there are some scientific articles available from BLS education that indicate simulation is becoming more systematically used for training BLS students. Many may use simulation methods in the curriculum without realizing the huge potential there is for added learning or training of soft skills. The more literature that becomes available the more we can learn across academic institutions. BLS students are facing challenges that we do not know about today, which is why educational methods could help prepare students for unpredictable situations and how to use their overall knowledge to handle the unknown.

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