

In Search of Effective Remote Learning Methods for the STEM Education

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The COVID-19 pandemic has drastically changed many aspects of people's lives including all forms of education. Online studies and distance learning have become the new global reality. This study offers a review of the effectiveness of remote-learning methods for the STEM education.

Some General Pedagogical Principles:

- Embrace the “Holy Curiosity” of students
- Motivate students, but not drill them
- Encourage to work creatively on projects
- Provide remote access to LMS & resources
- Help in preventing plagiarism and cheating
- Assess performance, learning outcomes. ■

Learning Management Systems (LMS) and “Traditional” Virtual Activities:

- Canvas™, Brightspace™, Blackboard™
- Online lectures with recordings on Panopto™ Cloud infrastructure via Zoom™
- Video conferencing (Zoom, RingCentral)
- Virtual lab demonstrations. ■

Open Educational Resources:

- ACM and IEEE Digital Libraries
- Digitized films and YouTube videos
- NASA STEM Engagement Website
- Open-source software (*SourceForge*)
- Specialized tools accessed remotely via Virtual Desktop Infrastructure

- Virtual lab tutorials: *Security Cloud Labs, Java Applets, String Matching Algorithms, Graph Theory Tutorials*
- Project-development environments and infrastructures. ■

Helping Students to Build-Up Strong Self-Study Skills:

- Experience and practices of the Open University of the Great Britain
- Introductory online courses at the Oxford University, UK
- The online curricula and Math & Science correspondence courses offered by Moscow State University and Moscow Institute of Physics and Technology
- Online courses and tutoring offered by Russian School of Math After School Program (Boston, Massachusetts, USA). ■

Other Factors of Improving Students' Learning Outcomes:

- Offering the online tutoring
- Providing regular faculty training sessions and workshops
- Supporting partnerships between academic institutions and high-tech companies (e.g., IBM, Microsoft, Oracle, McCabe Software Corp.)
- Assessing the role of multimedia platforms (YouTube, Facebook, Twitter)
- Searching for financial-support opportunities (National Science Foundation, David Foundation). ■

The Challenges of Unresolved Issues:

- Overcoming the constraints of old-style professional certification examinations and learning-outcome assessments
- Avoiding violations of students' privacy in Cloud environment and social-media communications
- Supervising the remote internships. ■

Life After the Pandemic Overcome

Many remote-access and communication options will continue using on campuses:

- More effective use of LMS
- Improving access to online resources
- Remote access to specialized software tools via Virtual Desktop Infrastructure
- Zoom class sessions during bad weather conditions or disasters
- Online tests and quizzes
- Virtual presentations at conferences
- Faculty Lecture Series
- Virtual office hours, Zoom meetings
- Online training sessions
- Virtual Private Network communication. ■

Few References:

- *Learning Management System Technologies and Software Solutions for Online Teaching: Tools and Applications*, IGI Global, 2010.
- *Learning Management Systems and Instructional Design: Best Practices in Online Education*, 2013.
- Riabov, V.V. “Teaching Online Computer-Science Courses in LMS and Cloud Environment.” *IJQAETE*, 2016, 5(4): 12-41.



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