

This doctoral thesis concerns the designs, creation, and a pilot survey of real remotely controlled laboratories that can be used for the introduction to modern physics within the integrated e-learning strategy. With grant support four new remote laboratory experiments could be created, featuring some innovations like the possibility to modify experimental setup, and the design allowing to make a mistake and to obtain nonsensical experimental data in order to test students' critical thinking. The new remote experiment topics are: laws of radioactivity, polarisation state of light, photoelectric effect, and the origin of spectral lines. The emphasis is put on easy experimental data acquisition (measurement, record, and download) for further scientific statistical or advanced graphical data processing. The pilot survey aims to select adequate research designs, tools, and data sources and it describes the results and experience from the observation at several Czech secondary schools. The most interesting findings were revealed by action log file analysis and interviews with teachers and students. Finally, real usability of remote laboratory experiments in lessons and physics education is discussed.