A common practice in improving the accuracy of finite element solutions is to use h-, p- and hp- refinement strategies. When using h-refinement, while keeping the approximation order of the element, p, fixed, the aim is to decrease the truncation error by increasing the number of degrees of freedom (''DoFs'').

However, when the number of DoFs becomes larger than a critical number N(p)\_opt, as a function of p, computational round-off errors accumulate, and start to exceed the truncation error. Since further refinements will even result in less accurate solutions, the total discretization error (truncation + round-off error) Err(p)\_min corresponding to N(p)\_opt is the minimum attainable error for p. Focusing on one-dimensional differential equations, we investigate this phenomenon and propose a systematic approach to identify N(p)\_opt a posteriori, both for the primary variable and its derivatives. We show that both N(p)\_opt and Err(p)\_min decrease for increasing p, which has led us to develop a practical a posteriori hp-refinement strategy that adjusts the mesh width h(p) in accordance with p so that for each p the optimal mesh width h(p)\_opt correlates with N(p)\_opt.

Furthermore, we show that the mixed FEM incurs smaller round-off errors compared with the standard FEM, thus allowing for a more accurate solution and also its derivatives.

Moreover, the possible influence factors on the discretization error, such as the L2 norm of the solution, working precision, computational mesh, type and implementation of boundary conditions and choice of solver, are also investigated. Finally, our strategy is successfully applied on a Helmholtz equation.