

# Abstract

Students embarking on their programming education encounter many challenges. One of the key challenges that they face is the complex syntax rules, which are often a significant source of frustration. Block-based languages, such as Scratch, have been developed to offer students a more accessible entry point to programming concepts. However, these tools are designed to be a stepping stone before transitioning to text-based languages, a shift that proves difficult for many learners. Pytch, a Python-based online development environment, aims to facilitate this transition by providing a user interface that incorporates familiar functionalities that can be seen in Scratch. Despite these efforts, Pytch is ultimately a text-based environment where syntax errors are common. Frame-based editing is a relatively new paradigm in the way users can interact with their program editing. It combines the structural clarity of block-based environments with the flexibility and control of text-based editing. It introduces block-specific functionality such as drag-and-drop for frames while also preventing common syntax errors such as incorrect indentation. This research draws on existing frame-based editors to implement and integrate a frame-based editor for the Pytch development environment. Tested among students with limited Python experience but familiar with block-based languages, the newly developed frame-based editor showed a reduction in errors generated by users, indicating that frame-based editing may be an area worth pursuing within the context of Pytch. Although there were some limitations in terms of the sample size and data collection, this research shows that frame-based editing may be a valuable endeavour for the future of programming education.