While blind and visually impaired (BVI) readers can access digital text information using auditory interface through screen readers, accessing mathematical equations is much more challenging task, which is known to limit access to STEM subjects for BVI students. This is primarily due to the complexities of equation layout as well as the linear syntactic rendering. Consequently, even the relatively simpler equations (containing small number of symbols) can lead to a very lengthy and unnatural speech string resulting in a high cognitive load for the reader. This thesis aims to address this issue by proposing innovative solutions to improve equation comprehension and accessibility for BVI individuals. \\

One approach to reduce this load can be to abstract parts of an equation/expression via some abbreviating symbol which is then read out separately. This division/partitioning into expressions is based on computing the cognitive complexity as "felt" by the reader. The unnaturalness in the speech string is due to syntactic rendering. Which can be improved by contextually aware audio rendering of equations- Adapting the speech output based on the context available in the surrounding text. \\

The first part of the research focuses on identifying a suitable metric for measuring the cognitive complexity of equations. A comprehensive user study involving eighteen BVI participants was conducted to capture their responses, including equation reproduction errors and time taken for comprehension. This data is used to propose candidate metrics and establish correlations with existing complexity measures in open-source math accessibility systems. Ultimately, a reliable complexity metric was identified that aligned well with the user study results, offering potential integration into screen readers for equation accessibility. \\

The second part of the thesis addresses the contextually aware audio rendering. We worked on an algorithm to extract contextual semantics of equations based on local definitions. The algorithm comprises of multiple modules, and utilizes various machine learning and pattern matching techniques. This contextual understanding enables adaptive audio rendering that takes into account the surrounding text, improving the comprehension and usability of equations. \\

This research contributes to the advancement of accessibility in STEM education for visually impaired individuals, particularly in the realm of equation comprehension and audio rendering. By introducing a cognitive complexity metric and algorithm for contextual semantic analysis, this thesis offers practical solutions to make mathematical equations more accessible to BVI readers. These findings have the potential to significantly impact the inclusion and educational opportunities for visually impaired students, empowering them to pursue STEM subjects with greater confidence and success.