<div align="center">

PROJECT SUMMARY

</div>

Overview:

Our goal is to build an open data-driven educational technology platform and run online learning experiments aimed toward improving open educational content. This platform, the Distributed Open Education Network (Doenet), is, at its core, a mechanism for measuring and sharing student interactions with web pages and storing anonymized data in an open distributed data warehouse. We propose to develop the Doenet platform and its ecosystem of tools for (a) authoring interactive educational content, (b) conducting educational research using the content, and (c) discovering the most effective content based on the research results. We will use these tools to develop open interactive educational content and conduct learning experiments to investigate the influence of different ways of guiding students through the interactive content. We will work with faculty and researchers from a variety of institutions to develop content and conduct learning experiments using the Doenet platform. Our initial focus will be on mathematics, followed by expansion to other STEM disciplines.

Intellectual Merit:

This project will generate new knowledge about the effectiveness of different activities for learning concepts online. In particular, we will investigate the benefits of virtual manipulatives as well as the influence of the support given to students as they navigate the activities. We will create tools to enable faculty to develop their own educational experiments and generate new knowledge. Through the analysis of the data generated by the project, we will discover ways in which students interact with online materials, and look for correlations between those interactions and learning gains. Knowledge gained from this analysis will aid in the development of more effective online learning activities and will help us build tools that instructors and students can use to locate the most effective content. As the data will be stored in an open data warehouse on Doenet, any educational researcher can probe the data to generate additional knowledge on how students learn through online activities.

Broader Impacts:

The Distributed Open Education Network (Doenet) is designed to reduce barriers to the development and access of online content and learning experiments. Its distributed architecture will facilitate participation without requiring one to set up a server or even have consistent internet access. As we develop the Doenet ecosystem, we will consult with a wide range of individuals to ensure that the tools are developed to meet the needs of faculty and students from different types of institutions.

Both content and anonymized data on Doenet will be publicly available. We will openly license all our content and will encourage other authors to use open licenses. The freely available course content can replace expensive textbooks and publishers' online learning tools to reduce the financial burden on large numbers of students. The courses in which we propose to implement Doenet content and experiments enroll over 10,000 students per year.

We will facilitate instructors' use of focused experiments to evaluate and improve the effectiveness of online educational activities, with a goal of developing a large community that seeks to discover the most effective approaches for promoting learning with these activities. By making tools, content, and experiments freely available and accessible through Doenet, we enable instructors and students worldwide to use these resources, modify them to suit their own needs, and share their improvements. As interactive materials and classes have been shown to be particularly effective for women and minority students, compared to standard lectures (Freeman, et al, 2014), making high-quality interactive online activities available to all students and instructors will help give everyone the best opportunity to learn.