

Effective Use of KeTCindy in an Experimental Study to Develop Methods of Teaching Mathematics

Koji Nishiura¹, Setsuo Takato², Kunihiti Usui³, Masaki Suzuki⁴

[nishiura@fukushima-nct.ac.jp]

¹ General Education, National Institute of Technology, Fukushima College, Japan

² Faculty of Sciences, Toho University, Japan

³ Control Engineering, National Institute of Technology, Kisarazu College, Japan

⁴ General Education, National Institute of Technology, Numazu College, Japan

In this study, we determine the aspects of mathematics that students of upper secondary and higher education find difficult to understand. Our research aims to create an effective method of teaching mathematics and to develop enhanced materials for teaching the topics that students find problematic. For these purposes, we conduct an experimental study using our previously developed Cognitive Detection Clicker, which facilitates recording of students' responses along with response times [1].

To create mathematics teaching materials, teachers often generate graphics. Although $\text{\TeX}$ is a popular tool to generate high-quality mathematical expressions or formulas in printed teaching materials, generating high-quality graphics in $\text{\TeX}$ documents is not easy. To overcome this difficulty, KeTCindy mathematical software is developed, which is a plug-in program for Cinderella dynamic geometry software [2]. It converts the procedure of drawing graphical objects on the Cinderella screen into $\text{\TeX}$ readable code, thus generating corresponding high-quality mathematical artwork in the final PDF output. Furthermore, KeTCindy is implemented with a function of calling other computing tools such as R and Maxima and many other additional functions [3].

We use KeTCindy in our experimental process, starting from creation of teaching materials to analysis of the results. In this talk, we will present those functions of KeTCindy used in our experimental study.

Keywords

KeTCindy, experimental study, methods of teaching mathematics

References

[1] K. NISHIURA, S. OUCHI, K. USUI, Analysis of the Use of Teaching Materials Generated by KeTCindy as an Aid to the Understanding of Mathematics, *Lecture Notes in Com-*

puter Science **10407**(4), 216–227 (2017).

[2] M. KANEKO, S. YAMASHITA, K. KITAHARA, Y. MAEDA, Y. NAKAMURA, U. KORTENKAMP, S. TAKATO, K_ET_Cindy–Collaboration of Cinderella and K_ET_pic, *The International Journal for Technology in Mathematics Education*, **22**(4), 179–185 (2015).

[3] M. KANEKO, S. YAMASHITA, H. MAKISHITA, K. NISHIURA, S. TAKATO, Collaborative use of K_ET_Cindy with other small tools, *The Electronic Journal of Mathematics and Technology*, **11**(2), 100–111(2017).