

Chapter 3

Original Teaching Materials and School Activities With Multimedia–Enabled Dot Codes

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ABSTRACT

Original teaching materials with dot codes, which can be linked to multimedia such as audio, movies, web pages, html files, and PowerPoint files, were created for use with students with disabilities. Hand-crafted original teaching materials can easily be created by the users themselves—for example, by schoolteachers—with newly developed and easy-to-handle software. A maximum of four multimedia files can be linked to each Post-It sticker icon and/or dot codes overlaid with a specially-designed software (GM Authoring Tool), and such multimedia files are replayed with a specially-designed sound pen (G-Speak) and scanner pen (G-Pen Blue) with Bluetooth functionality just by using the pen to touch the Post-It sticker icon and/or the dot codes on the printed document. Many activities using dot code materials have been successfully conducted, especially at special needs schools. Basic information on the creation of these materials—and on their use in schools—is presented in this chapter.

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INTRODUCTION

With the use of better screening and identification, Japanese schools have been better able to help special needs students at an earlier age than ever before. THEN start with the first sentence about the number of identified kids in Japan. There are 1,135 special needs education schools; about 142,000 students are enrolled there, and nearly 84,000 teachers work there (Statistics Japan, 2017). In general-education schools, more than 6.5% of all the students have some sort of difficulty in joining in learning along with the class (Ministry of Education, Culture, Sports, Science and Technology—Japan, 2016).

Each student with a disability has different hopes, needs, and desires; and a unique learning history. Each year, the teachers at special needs school deeply feel that a wonderful teaching aid and specific materials suitable for one student in the previous class does not fit a new student at all. Each student with a disability may need individual hand-crafted teaching aids and materials. It's a reasonable reason why easier-to-handle and cheaper tools and software might be indispensable means for schoolteachers to create their own content for each student in their classes.

A Grid Onput dot code – originally developed by Gridmark, Inc., Japan (Gridmark, 2009) – is a set of novel two-dimensional codes comprising extremely small dots. Such dot codes can invisibly overlay any graphically-printed letters, photos, and illustrations with no impact whatsoever on the designed visual images—meaning that letters, photos, and illustrations can be changed into information-trigger icons. A maximum of four voices and sounds – as well as other media such as movies, Web pages, and PowerPoint files – can easily be linked to each dot code icon. Simply touching the dot codes (printed on ordinary paper) with a sound pen (e.g., G-Speak) and/or a scanner pen with Bluetooth functionality (e.g., G-Pen Blue) enables students to access the digital information directly. To print a document that includes the “invisible” Grid Onput dot codes, industry-standard Cyan-Magenta-Yellow-Black (CMYK) processes are required. More specifically, carbon ink that absorbs infrared rays is used only for dot code printing, while non-carbon ink is used to print graphics. The sound and scanner pens read the invisible dot codes using built-in infrared cameras.

One of the authors (Ikuta), from Otsuma Women's University, Japan, has been involved in organizing a worldwide collaborative research group to develop original, hand-crafted teaching materials using advanced ICT tools—and, in partnership with the Japanese companies Gridmark, Inc., FUSE Network Inc. (FUSE Network, 2010), and Apollo Japan (Apollo Japan, 2005), has conducted school activities at both special-needs and general-education schools. Original teaching materials with dot codes and e-books with media overlays (International Digital Publishing Forum, 2011) were created by the authors, who then conducted activities in schools for students with intellectual and expressive language disabilities. Particularly, the dot code activities developed for use by mentally disabled and autistic children showed that original teaching materials and tools, along with the associated school activities, were very useful both in enriching the students' understanding of words and phrases and in improving their speaking ability (Ikuta, 2008; Ikuta, Endo, Nemoto, Kaiami, & Ezoe, 2013; Ikuta & Kasai, 2014; Ikuta et al., 2015; Ikuta et al., 2017; Ikuta, 2018).

In this chapter, the authors provide guidance on the creation of focused materials with newly-developed software and hardware on Grid Onput dot code, and provide an overview of useful and helpful school activities for students with any number of a variety of disabilities.

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