

Enabling Interaction for Kids in Bumbo Chairs

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EXTENDED ABSTRACT

The purpose of this project was to design, develop, and produce a custom table that allows for up to four children sitting in Bumbo chairs to sit together and interact with each other. A Bumbo chair is a small, soft chair made of a foam-like material that conforms around a child's sitting posture and gives support to the child. These chairs are commonly used for children under one year of age. This chair is frequently used by Signal Centers; a group of day schools in southeast Tennessee caring for young children with and without physical and mental delays. The children need a surface area on which they can place small objects such as toys, food, and educational materials. The original manufacturer offers a tray as an accessory to the Bumbo chair; however the staff at Signal Centers has identified several problems with this tray. First, the tray can only be used by an individual child; not groups. Second, the tray is also unstable, making it unsuitable to hold drinks that may be spilled. Third, the staff has complained that it is difficult to attach the tray to the Bumbo chair, and that children are often able to remove the tray themselves. It was therefore the goal of the design team to create a table that eliminates all of these problems while allowing the children to interact with each other.

The project was offered as one of many student team projects in the University of Tennessee at Chattanooga's (UTC) freshmen Introduction to Engineering Design (IED) course. Students elected to work on the project because of individual interest in the project topic and customers.

To begin the project, the design team identified, through discussions with the customers, functions and objectives the table should meet. Some of the requirements include being portable (light weight and not cumbersome), conforming to the design of the current Bumbo chair, and being safe for children less than one year of age. The design team brainstormed and developed several different designs which were then presented to the faculty and staff at Signal Centers for evaluation. A design was selected and a functional, wooden prototype was produced and then tested by the customer who made suggestions for improvements. The final design includes a top made from high density polyethylene plastic and commercially available metal table legs. The table legs allow the table's height to adjust, especially to an uneven floor. The legs are also detachable for storage purposes. High density polyethylene was selected due to its low cost, light weight, and durability. The polyethylene was milled by the student team using a CNC router.

The designed table meets all the objectives, functions, and constraints defined by the customers. Weighing 18 lbs, the table meets the requirement of weighing less than 25 lbs. The table was specified to safely hold 50 lbs; however it was tested to safely support over 150 lbs. The legs are removable so that the table can easily be put in storage when not in use. The table is stable and does not tip over easily. This is important because many of the children at the school are learning to walk and will hold on to the table for their own stability. The materials used in the table ensure that it is durable and will remain in service at Signal Centers for many years.