Equipment Adaptations to Improve Workshop Performance

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The occupational therapist who works with mentally retarded clients in a sheltered workshop is often confronted with the problem of persons who cannot do their assigned jobs because of physical, motor, cognitive, or perceptual impairments. Adaptive equipment, or jigs, can often be used to help the client perform the assigned task. When a jig is specially designed for the client’s total treatment needs in addition to his or her workshop needs, it can serve to meet therapeutic as well as job performance goals.

Generic and Individualized Jigs

Jigs are used in industry as well as in sheltered workshops to increase the productivity and accuracy of workers (Conant & Sammartino, 1977; Davis & Fargher, 1984). Jigs that are designed for disabled clients help to stabilize materials, guide movements, provide cues, or give physical assistance (Davis & Fargher, 1984). In most cases, a single jig is designed for a particular job and is used by many clients, most of whom have very different skill levels and needs (Olsen, 1981). This type of jig is called a generic jig.

Our facility, located on the grounds of a state institution for mentally retarded patients, employs approximately 160 mentally retarded and physically disabled adults. We use both generic and individualized jigs in our workshops. Individualized jigs, like generic jigs, are designed to facilitate job performance, but they also address the clients’ unique clinical needs.

When our workshop subcontracts a job that has a short turnaround time and that will probably not be renewed, only the most skilled workers are used. However, when we receive ongoing jobs that do not have pressing deadlines, we have the opportunity to train the slower, less skilled clients. Often, these workers have physical, motor, or cognitive/perceptual deficits that are being treated by an occupational therapist. The case of Mr. E. demonstrates how individualized jigs can be designed to allow a disabled worker to participate in ongoing subcontracted jobs, as well as to help meet therapeutic goals.

Background

Mr. E. was a 52-year-old man with moderate mental retardation secondary to perinatal encephalopathy. He also had spastic quadriplegia, mild kyphoscoliosis, severe dysarthria, and brachial plexus palsy. He had contractures of the lower extremities, which required him to use a motorized wheelchair.

At the time of this report, Mr. E. had been employed at our sheltered workshop for 10 years. He primarily worked on tabletop assembly tasks for 5 hours per day. Mr. E. sometimes performed piece-
work on subcontracted jobs that were within his ability. At other times, he participated in training tasks that simulated jobs but that were paid at a lower rate. Because of his limitations in upper extremity bilateral coordination, fine and gross motor control, and eye-hand coordination, his work quality was often substandard; therefore he was often assigned training tasks. Mr. E. was a very social man who was aware that his co-workers performed different and more varied tasks.

Evaluation

An occupational therapy evaluation of Mr. E. revealed deficient bimanual coordination, primarily due to athetoid movements of the upper extremities and contractures of the right elbow and shoulder. Mr. E.'s right upper extremity was more affected than his left, and his right hand function was limited to grasp and release movements. Supination of the right upper extremity was limited to 30°. Range of motion and strength of the left upper extremity were within normal limits, but fine motor skill of the left hand was affected by athetoid movements of the trunk, head, and arms. Eye-hand coordination was further affected by poor eye tracking skills. A perceptual-motor evaluation revealed good visual-spatial, figure-ground, and sequencing skills.

Mr. E. was observed performing several workshop tasks—two jobs and one training task. The first job required him to construct a box, fill it with four cylindrical vials, and then close the flaps. The second job required him to open a plastic bag, insert a brochure partially into the bag, and then fold the bag in half. The training task required him to place four screws into a small bottle and then cap the bottle.

Before occupational therapy intervention, Mr. E. was unable to perform the brochure job. He performed the training task unilaterally, using only his left hand to drop the screws into the bottle and cap it. Mr. E. was able to perform the box job by using a

generic jig to form the box, but his performance was slow and often wasteful of materials. The generic jig was clamped to the table for him so that he needed to use only his left hand, but to fill the box, he then had to remove the box from the jig and hold the box in his right hand. This additional step slowed his performance and, because of fluctuating muscle tone, he often crushed the boxes with his right hand, making the end product unacceptable.

After evaluating Mr. E., observing his performance, and consulting with his workshop team and the unit occupational therapist, I established several workshop goals for him. These goals included improvement in the quality and speed of Mr. E.'s work and expansion of his job repertoire. Meanwhile, the unit occupational therapist established a therapeutic goal, which was to improve the voluntary release of Mr. E.'s right hand. These workshop and therapeutic goals were discussed and agreed on with Mr. E.

Equipment Adaptations

Mr. E.'s treatment program involved the design and construction of individualized jigs to accomplish the workshop and therapeutic goals mentioned above. The materials used in the construction of these jigs—wood, particleboard, and plaster—were chosen for their durability, low cost, and ease of fabrication. All of the jigs were constructed with the use of hand tools or simple power tools. After Mr. E. was trained in the use of these jigs and it was determined that he could use them successfully, workshop staff were trained in the jigs' setup and use.

Box-making jig. The box-making jig was adapted from a generic jig. A handle was added to facilitate right hand grasp. Previously, the jig had been secured to the tabletop, thus requiring no active use of Mr. E.'s right hand. With the addition of the handle, Mr. E. was required to perform grasp and release motions several times a day (see Figure 1). The use of the jig in this way made the work activity a bilateral task, which encouraged bimanual coordination. Mr. E. used this jig to construct boxes for an entire 2-hour work session and performed the next aspect of the task, which was filling and closing the boxes, during the next 2-hour work session.

Box-holding jig. Because of his fluctuating muscle tone, Mr. E. would often crush an empty box while holding it in his right hand. The box-holding jig allowed him to use his right hand to perform the task with minimal damage to the boxes (see Figure 2).

Vial-holding jig. The vial-holding jig was secured to the table with a touch fastener. Mr. E. would place two vials, one at a time, into the holder. He was then able to pick up two vials at once and drop them into the box, which was a more efficient way to perform

Figure 1. Use of the box-making jig, which facilitates bimanual coordination and grasp and release.
the task. The vial-holding jig was designed to accommodate a normal pattern of reach and grasp.

**Clip jig** The clip jig was designed for the training task of placing four screws into a bottle. Mr. E. had previously performed this task by placing the bottle on the table in front of him and dropping the screws inside. However, with the clip jig, Mr. E.'s right upper extremity was actively involved in the task, which facilitated bilateral upper extremity use and control of right hand movements (see Figure 3).

**Brochure jig** To operate the brochure jig, Mr. E. used only his left upper extremity. He pulled the hinged piece down to bring the double-sided tape in contact with the top bag. He then lifted this piece, with the bag, back to an upright position, where it was secured with a touch fastener. He was then able to open the bag and drop the brochure inside (see Figure 4). Although this jig did not require right upper extremity use, it did allow Mr. E. to participate in a job that he had previously been unable to perform.

**Outcome**

The jigs designed specifically for Mr. E. have helped him attain his workshop and occupational therapy goals. These individualized jigs enabled Mr. E. to participate in the brochure job, which pays well, and to work with more accuracy on the vial job. The addition of handles on several of Mr. E.'s jigs required him to work on his right hand grasp and release skills throughout the day. This has resulted in improved speed and control of voluntary release of Mr. E.'s right hand, as noted by his unit occupational therapist. Before using the jig adaptations, Mr. E. took an average of 7 sec to release an object placed in his hand. After using the individualized jigs for 1 year, Mr. E. could release the same object after 2 or 3 sec and was no longer reluctant to use his right hand to stabilize objects.

**Conclusion**

Use of individualized workshop jigs to meet the specialized needs and goals of clients has proven to be a beneficial treatment modality for Mr. E. and for other clients at our facility. Individualized jigs have enabled clients with severe physical disabilities to perform jobs that they were previously unable to perform. In such cases, the jig substitutes for the client's impaired motor function. For clients with less severe physical disabilities but more severe cognitive deficits, jigs can function as teaching aids. For example, the jig can provide visual or tactile cues that will allow the client to perform the desired task correctly. Often these jigs
help teach tasks and can be discontinued after several months. Jigs can be useful tools for enhancing motor skills, teaching new tasks, and increasing the productivity of disabled workers.

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References


Editor's Note. To continue the Case Report department, we need and welcome reports that document the practice of occupational therapy for specific clinical situations. Guidelines for writing case reports are available from the Editor.