The computer is the most acclaimed and revolutionary tool of the latter part of the 20th century. More than 10 years ago, Carroll English (1975) described many potential uses for computers as tools in occupational therapy. She predicted that "gaining acceptance of computerization by members of an institution or a profession is more difficult than working out technical problems" (p. 47). In the last decade, dynamic changes have minimized the technical problems of computers, and the versatility and accessibility of software and hardware have dramatically increased. After reviewing the literature, a nationwide survey was conducted to provide therapists with information to assist them in evaluating the relevance of computers as tools for their practice. Examples of current uses of computers by occupational therapists and helpful data regarding types of computer materials used were also obtained.

**Literature Review**

English (1975) suggested that the computer could be used by occupational therapists in the following ways: as aids in data collection for administration (i.e., treatment charges, equipment, and staffing), for facilitating clinical decision making based on treatment outcome studies, as a device that can help create (a) job potential for the disabled and (b) recreation and art opportunities, for computer-assisted instruction, and as a method to evaluate professional standards. Despite this inviting presentation of therapeutic potentials, only two articles, both addressing educational uses, were found in the *American Journal of Occupational Therapy* in the seven years after the publication of English's article (Hawkins, 1978; Dengler, 1983).

Since 1983, the literature and the activities of the profession have demonstrated a more active interest in computers. Continuing education courses and presentations on computer use in occupational therapy have been more prevalent at state, regional, and national levels. Brief accounts of membership activities and questions about computers have appeared in *Occupational Therapy News* (Garibaldi, 1984; AOTA, 1985; Boggus, 1985; Beatty, 1985; Hi lowitz, 1985). Microcomputers have been discussed in two special interest section newsletters (AOTA, 1984; Okoye, 1985) where they have been identified as viable therapeutic tools for use in such areas as environmental control, prevocational evaluation and training, perceptual/cognitive training or retraining, communication, muscle reeducation, and finally, as a therapy motivator for skill development in business and for academic or recreational pursuits. The diversity of input and output devices makes this tool readily accessible to persons who are severely handicapped.
through congenital, developmental, or traumatic causes.


During the past 4 years, the American Journal of Occupational Therapy has published only two articles on computer use (Mansfield, 1983; Skinner & Trachtman, 1985). Occupational Therapy in Health Care highlighted computers and occupational therapy in one article and subsequently published a special issue on the topic (Breines, 1985; Cromwell, 1986).

In Canada, Stride (1982) described computer use by persons with severe physical disabilities and included adaptation information and an assessment form for potential users. Marina’s (1984) survey of 34 Ontario physical rehabilitation units showed that 12 (or 35.3%) used computers, and that 72.7% of these 12 used the Apple II microcomputer. The computers were used for clinical purposes by 11 centers, for administrative purposes by 3 centers, for research by 3 centers, and for recreation by 8 centers. They were used primarily for cognitive retraining and vocational training/retraining for individuals who had suffered stroke or head injury. Computers were also used for recreation by persons with spinal cord injury.

Similar articles on computer applications have been published in other medical publications. A classic resource is the annual publication of the Proceedings of the Johns Hopkins National Search for Application of Personal Computing to Aid the Handicapped (Institute of Electrical and Electronics Engineers, 1981). The October 1982 issue of Exceptional Children contains several articles relating the microcomputer to multiply disabled and learning-disabled children (Thomas, 1982). Rehabilitation Literature, March/April 1983, has an introductory article by Vanderheiden describing the practical aspects and the barriers in using microcomputers in rehabilitation and another by Horsman on speech input computers. A 1984 issue of the Archives of Physical Medicine and Rehabilitation has articles on computerized data management assisting in clinical decision making (Lehmann, Warren, Smith, & Larson, 1984) and videogame adaptation for individuals with high-level spinal cord injury (White, Wussow, & Merritt, 1984). Nursing Times and Physical Therapy have articles on computer uses in administration and documentation (Cohen, 1983; Crowe, 1984). A final example is the January issue of Cognitive Rehabilitation, which records a conference session with distinguished participants who discussed cognitive retraining through computers (Bracy, Lynch, Sbordone, & Berrol, 1985).

Studies of the efficacy of computers in treatment are scarce, with the exception of a pilot evaluation of computerized video tasks as training techniques for driving-related perceptual deficits of persons with brain damage (Sivak, Hill, & Olson, 1984).

Purpose of This Study

The increased use of computers in all aspects of life is an excellent springboard for the analysis of the use of such a prominent tool and its role and potential for further involvement in occupational therapy. Computers are important tools for the profession to consider because they are meaningful and effective both in health care and within society at large.

This study offers specific data on and examples of how occupational therapists currently use computers and demonstrates how computers (or any other tool) can be evaluated for relevance to occupational therapy. We have activated Reed’s (1986) model that advocates the use of investigatory questions (e.g., who, what, when, where, how, and why) for the vital task of evaluating the relevance of professional tools. A review of the literature supplied descriptive information on these questions, and a nationwide survey provided the following statistical data:

- Type of center surveyed and size of occupational therapy staff, diagnostic caseload, and length of stay (who)
- Use of either macrocomputers (institution-wide systems) or microcomputers (personal/freestanding systems) by occupational therapists in occupational therapy departments or elsewhere in center (what and where)
- Type of hardware, software, and peripheral devices used (what)
- Major purposes and functions of computers in occupational therapy practice (why and when)
- Major factors influencing (a) the choice of computers and equipment and (b) the nonuse of computers (why)

Methodology

Sample

A study sample was obtained through the 50 occupational therapy state associations who supplied lists of centers where occupational therapists were employed. From these lists, 15 states were selected based on their usable identification of at least 20 centers or practices, their size, and their geographic diversity. The states used were as follows: Connecti-
cut, Maryland, New Jersey, Pennsylvania, Vermont (East); Hawaii, Montana, Utah, Washington (West), Illinois, Iowa, Nebraska (Midwest); and Arkansas, South Carolina, and Georgia (South). Centers within these states were randomly selected to yield a final study sample of 298 occupational therapy directors. (Because of labeling errors, two of the targeted centers were not surveyed.)

**Instrument**

The questionnaire design was based on therapists' computer use as described in the literature and on the five survey components detailed in the above purpose statement. A team of occupational therapists who use computers, or are familiar with research design, critiqued the questionnaire for validity and design. A second group of therapists who use computers reviewed the revised form, and their feedback regarding clarity and relevance was used for the final format. The questionnaire contained five demographic inquiries and nine multiple-option questions regarding types of computer and equipment used, purposes of use, and factors affecting selections or nonuse of computers.

**Procedure**

Questionnaires and stamped, self-addressed envelopes were mailed to the members of the study sample and return was requested within 4 weeks. A second mailing was made at the end of the 4-week period, and a final mailing was sent 3 weeks later. Confidentiality was ensured by coding responses.

**Results**

Of the 298 questionnaires sent, 238 (or 80%) usable surveys were returned. For the remaining 60 centers, 9 questionnaires were returned indicating that no occupational therapists were currently employed at the center, 12 questionnaires were returned as nondeliverable, and 39 questionnaires were not returned at all.

The raw data and percentages of the type of facility where the survey respondents worked are listed in Table 1. A comparison of these data with the facility

### Table 1

**Demographic Data (in percentages)**

<table>
<thead>
<tr>
<th>Type of Center</th>
<th>General Hospital (n = 59)</th>
<th>Rehab Center (n = 32)</th>
<th>Psychiatric Treatment (n = 22)</th>
<th>Public School (n = 42)</th>
<th>Pediatric (Other) (n = 22)</th>
<th>Doctor's Office/Private Practice (n = 9)</th>
<th>Mental Retardation Treatment Center (n = 10)</th>
<th>Nursing Home (n = 26)</th>
<th>Home Health (n = 13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% responding</td>
<td>25</td>
<td>14</td>
<td>9</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>11</td>
<td>5</td>
</tr>
<tr>
<td>% of AOTA members per typeb</td>
<td>25</td>
<td>9</td>
<td>10</td>
<td>18</td>
<td>9</td>
<td>5</td>
<td>4</td>
<td>10</td>
<td>4</td>
</tr>
<tr>
<td>Inpatient</td>
<td>18</td>
<td>24</td>
<td>55</td>
<td>-c</td>
<td>22</td>
<td>-</td>
<td>78</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>Outpatient</td>
<td>15</td>
<td>2</td>
<td>18</td>
<td>-c</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>78</td>
<td>89</td>
</tr>
<tr>
<td>≥75% inpatients</td>
<td>47</td>
<td>57</td>
<td>53</td>
<td>-</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>78</td>
<td>89</td>
</tr>
<tr>
<td>≥75% outpatients</td>
<td>10</td>
<td>35</td>
<td>35</td>
<td>-</td>
<td>22</td>
<td>-</td>
<td>-</td>
<td>78</td>
<td>89</td>
</tr>
<tr>
<td>No. of staff members</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-3</td>
<td>48</td>
<td>47</td>
<td>68</td>
<td>85</td>
<td>77</td>
<td>100</td>
<td>80</td>
<td>80</td>
<td>85</td>
</tr>
<tr>
<td>4-6</td>
<td>28</td>
<td>15</td>
<td>27</td>
<td>7</td>
<td>9</td>
<td>10</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>&gt;7</td>
<td>24</td>
<td>38</td>
<td>38</td>
<td>5</td>
<td>9</td>
<td>(5 NA)</td>
<td>(5 NA)</td>
<td>(10 NA)</td>
<td>(5 NA)</td>
</tr>
<tr>
<td>Length of stay</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;2 weeks</td>
<td>33</td>
<td>3</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>2-4 weeks</td>
<td>33</td>
<td>16</td>
<td>27</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>11</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>1-3 months</td>
<td>21</td>
<td>31</td>
<td>31</td>
<td>11</td>
<td>11</td>
<td>11</td>
<td>-</td>
<td>76</td>
<td></td>
</tr>
<tr>
<td>3-6 months</td>
<td>7</td>
<td>19</td>
<td>18</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>80</td>
<td>77</td>
<td>8</td>
</tr>
<tr>
<td>&gt;6 months</td>
<td>2</td>
<td>31</td>
<td>31</td>
<td>95</td>
<td>72</td>
<td>22</td>
<td>80</td>
<td>77</td>
<td>8</td>
</tr>
</tbody>
</table>


* Statistics from three nongroupable centers (one research center, one school for certified occupational therapy assistants, one health board) are not listed but were included in the general data. *Data are from AOTA's 1982 Membership Data Final Report. *Inconsistent reports of status. *Hand problems.
percentages from AOTA's 1982 Member Data Survey Final Report indicated that the respondents appeared highly representative of the general population of occupational therapists. The one exception, however, is the high percentage (22%) of pediatric occupational therapists employed outside public schools, which was not evident in the membership survey.

Table 1 also presents demographic data regarding inpatient and outpatient treatment percentages, the length of stay, major patient diagnoses, and the size of occupational therapy staffs. The Member Data Survey Final Report (AOTA, 1982) identified the mean size of staffs to be 4.2; yet, 68% of the computer survey respondents' centers had only 1 to 3 staff members, and only 16% had 4 to 6 staff members.

Availability and Primary Use

Macrocomputers were defined as system-wide devices for integrated institutional functions. Microcomputers were defined as personal or freestanding systems.

Terminals for macrocomputers were located within the occupational therapy department in 18 centers (8%) and were available elsewhere for occupational therapists and others to use in 34 centers (14%). Thus, 22% of all responding centers (N = 238) had access to macrocomputers. In contrast, macrocomputers were located elsewhere but not available for occupational therapy use in 75 (or 31%) of the centers, and no macrocomputers were identified in 101 (or 42%) of the centers. Figure 1 displays the computer availability according to the type of computers and location (in occupational therapy departments or elsewhere in the hospital or center) at the different types of responding occupational therapy practice centers.

Consistent with their system-wide purpose, the largest number of macrocomputers and terminals available for use by occupational therapists was in the larger institutional settings of general hospitals and rehabilitation centers. This type of center characterized the work setting for 38% of the respondents. Psychiatric treatment settings, both community based and institutional, represented 9% of the sample and have a moderately high operation of macrocomputers (55%). However, only 14% of these settings had terminals in occupational therapy departments or had terminals available for use by therapists. In the remaining six groups of centers identified in this survey, 59% to 78% did not have any macrocomputers.

Microcomputers were available in 26 (or 11%) of the sample occupational therapy departments whereas in 57 (or 24%) of the centers, they were available (to staff members, including occupational therapists) in other locations. Therefore, 35% of the departments had access to microcomputers at the time of the survey. An additional 15 (or 6%) of the respondents reported that they were in the process of requesting or obtaining microcomputers.

General hospitals and rehabilitation centers had the highest percentages (17% and 22%) of microcomputers in occupational therapy departments. However, public schools, private and office practices, psychosocial, and nonschool pediatric settings had equal or greater total access to microcomputers within their centers (37% to 55%). Nursing homes and mental retardation treatment centers had 8% and 20% microcomputer availability, respectively.

Hardware, Software, and Peripheral Devices

The hardware, software, and peripheral devices used by the 83 centers with access to microcomputers are reported in Table 2. The use of peripheral devices was commonly reported by general hospitals, rehabilitation centers, public schools, and pediatric therapists.

Computer Purposes

More than 90% of all respondents identified management and administrative purposes as the most frequent use for both types of computer systems. The other most important uses for macrocomputers were in the areas of statistical analysis of client performance (36%) and for note writing and treatment planning (both 24%). For microcomputers, after management and administrative functions, the most prominent application was treatment and patient oriented, and these applications included the evaluation of control and personal independence (55%), motor
Table 2

<table>
<thead>
<tr>
<th>Hardware</th>
<th>%</th>
<th>Software</th>
<th>%</th>
<th>Peripheral Devices</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>57</td>
<td>Games</td>
<td>49</td>
<td>Keyboard overlays</td>
<td>28</td>
</tr>
<tr>
<td>IBM</td>
<td>41</td>
<td>Word processing</td>
<td>43</td>
<td>Voice synthesizer</td>
<td>14</td>
</tr>
<tr>
<td>Commodore</td>
<td>11</td>
<td>Data base</td>
<td>29</td>
<td>Switches/controls</td>
<td>20</td>
</tr>
<tr>
<td>Wang</td>
<td>6</td>
<td>Cognitive rehabilitation programs</td>
<td>28</td>
<td>Hand operated</td>
<td>32</td>
</tr>
<tr>
<td>Atari</td>
<td>3</td>
<td>Graphics</td>
<td>13</td>
<td>Head operated</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>12</td>
<td>Spreadsheets</td>
<td>11</td>
<td>Foot operated</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other (includes typing)</td>
<td>12</td>
<td>Mouth operated</td>
<td>6</td>
</tr>
</tbody>
</table>

Information regarding useful factors for selection and the types of software, hardware, and peripheral devices used may provide assistance to therapists who, like some respondents in this survey, do not know how to begin evaluating or implementing the use of a computer.

Discussion

Demographic Indicators

Of the demographic data collected from this survey regarding the type of center, number of occupational therapist staff, length of patients' stay, and diagnostic treatment load (see Table 1), the type of center and the diversity of treatment loads seemed to be most indicative of use or nonuse of computers. Nursing homes, home health services, and mental retardation centers all had low patterns of computer use and low diversity of treatment loads. While all three of these groups also had small staffs and moderate- to long-term lengths of stay or treatment, these factors were also true for schools and other pediatric settings. Rehabilitation, psychiatric, and private offices all had similar lengths of stays. Rehabilitation centers, nursing homes, and home health services had high numbers of patients who had had cerebral vascular accidents or other neurological dysfunctions. However, the rehabilitation centers had more diversity in diagnostic services and, ostensibly, in patient ages. Similarly, while the general pediatric centers had large populations with developmental delays (65%), they had more diagnostic variation than the 90% developmentally disabled populations of the mental retardation treatment centers.

Although an attempt was made to diversify the states used to obtain the sample centers by size and location, this effort was limited by the number of state associations that responded with usable lists. None of the five states with the highest percentage of employed occupational therapists returned such lists. We do not know how data from these states might have influenced this study.

Potential Factors for Nonuse of Computers

Thirty percent of the sample indicated some concern regarding the legitimacy of the computer as an occu-
pational therapy treatment tool. In the internal professional debate regarding purposeful activity and crafts, the computer may be viewed by some therapists as an external mechanized device in which the body and mind have little interaction. However, others may have used their activity analysis skills to evaluate the hardware, software, and peripheral device applications for treatment and, thus, see in computers a diverse and adaptable medium for motor, cognitive, perceptual, sensory, and social purposes. These therapists may view computers as an ideal modern purposeful activity and occupational therapy modality.

Computers have the potential to provide many individuals who have minimal mobility or impaired speech, sight, motor strength, or coordination with “doing” opportunities that can fulfill the vital need for mastery and competence. Fidler (1981) presented the concept that society’s values and norms weigh certain tasks and activities; the mastery and competence in these activities are valued more highly by society and contribute to the relevance and importance of that ability to the individual. In today’s communication and information society, the use of computers may present the opportunity for patients to gain a valued skill and status in society.

Lack of documented effectiveness was identified by 21% of those surveyed as one of the major factors influencing their nonuse of computers. Indeed, the documentation of potential methods for use has only begun, and empirical evidence of effectiveness will need to follow.

The cost of the initial equipment and difficulty in getting funds were major hindrances identified by 46% and 45% of the respondents, respectively. Any new equipment expenditure is scrutinized in this period of change under diagnostic-related group reimbursements. However, the documentation in the literature of the use of computers and an identification of their versatile and adaptable purposes for practice may help administrators or local fund-raising organizations in compiling a successful marketing proposal for computer equipment.

The final two factors identified as most influential in the nonuse of computers by those surveyed included “lack of information on how to begin” (37%) and “concerns regarding lack of computer literacy” (46%). The literature may motivate other occupational therapists to evaluate the computer for use in their practice.

Future Research Considerations

Computers were reported to be available somewhere within their work center by 35% of the sampled occupational therapists. However, within the occupational therapy departments themselves, only 8% of the therapists have macrocomputer terminals and only 11% have microcomputers. With this large discrepancy, future researchers may wish to investigate if access to computers is in fact limited physically (because of the inconvenience of having to go outside the department to use shared computers) and/or psychologically (because of a lack of “ownership” or identification of computers as occupational therapy tools). Both of these limitations could minimize therapists’ motivation to gain computer skills and incorporate the use of computers in their treatment plans. Other researchers might examine the number of occupational therapy staff members who use available computers and the frequency of computer use for different purposes. Finally, empirical research on the effectiveness of this tool is needed.

Acknowledgments

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