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ORIGINAL ARTICLE

Enhancing Occupational Therapy Students' Knowledge, Competence, Awareness, and Interest in Accessibility

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accessibility;
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Summary *Objective/Background:* The purpose of this study was to assess whether the incorporation of an environmental assessment for accessibility, as part of an "Activity Analysis" course, would enhance new students' knowledge, competence, awareness, and interest in accessibility issues for people with disabilities.
Methods: In this research, we included an out-of-class training of environmental assessment for accessibility. One hundred and two 1st-year occupational therapy students at Tel Aviv University participated in this research. Of the 102 participants, 56 experienced the training and 46 did not but attended the regular Activity Analysis course. The students explored a typical community environment, during which a specific checklist was used for assessing levels of accessibility. The "Accessibility-Knowledge Competence Awareness and Interests" questionnaire was administered before and after the course to both groups.
Results: Students who participated in the out-of-class training showed significant increases in their knowledge, competence, and partial awareness of accessibility and also had better grades in two separate courses that required knowledge of accessibility. There was no significant difference in the results of the Accessibility-Knowledge Competence Awareness and Interests before and after the Activity Analysis course in the control group.
Conclusion: The findings of the current study support the contribution of teaching 1st-year occupational therapy students the principles and practices of accessibility for people with disabilities, by improving their knowledge and level of competence at this early stage of their professional lives. Further studies are needed, however, to determine the optimal course of implementation in order to enhance awareness and interest in the subject of accessibility.

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Introduction

An enabling environment is one of the central factors in optimizing an individual's performance of his or her everyday activities. This notion has been recognised by professional occupational therapy bodies (American Occupational Therapy Association, 2014; Townsend & Polatajko, 2013). The implementation of laws and regulations designed to combat discrimination against individuals with disabilities in Western countries—especially those dealing with the provision of accessibility (Fembek, Butcher, Heindorf, & Wallner-Mikl, 2012; National Governors Association, 2012—2013; The Council of the European Union, 2000; U.S. Department of Justice, 2009; Waddington & Lawson, 2009)—has opened up new opportunities and given hope to those who stand to benefit. The United Nations Convention on the Rights of Persons with Disabilities (2006) declared that disability results from the interaction between persons with impairments, and the environmental barriers that hinder their full and effective participation in society. Subsequently, the education strategy of health professionals needed to be revisited so that students would become aware of, and fully understand, these concepts. Students who enrol in health profession programs can benefit from opportunities to explore the complex challenges facing people with disabilities in everyday life (Flecky, 2011). This poses unique challenges for an occupational therapy education program, whose goal is to implement these ideas into the curriculum (Ratzon, Avrech Bar, & Halevy, 2006).

Occupational therapy educators also need to deal with the challenge of providing an education curriculum that helps students move from a theoretical understanding to application of theory in the complexity of actual service situations (Spalding & Killett, 2010). To bridge this gap, health programs in general, and occupational therapy in particular, use different teaching methods such as problem-based learning (Reeves et al., 2004), clinical experience (Cavanaugh & Cohen, 2012; Rodger, Fitzgerald, Davila, Miller, & Allison, 2011), and simulation (Bethea, Castillo, & Harvison, 2014). Simulation learning has been recognised as facilitating the application of theory within a safe and controlled environment (Hope, Garside, & Prescott, 2011).

Occupational therapy educators use both traditional "chalk and talk" lecture approaches with more active learning techniques in their courses (Bennett, 2001; Jakee, 2011). They "develop teaching styles based on their pedagogical beliefs and use instructional methods that can be broadly classified as teacher-centred (e.g., lectures) or student-centred (e.g., simulation, experiments, field experiences)" (Lawson, 2014). The way educators construct and present course content can lead students to value it in a particular way (Stes, Coertjens, & Van Petegem, 2010). Adult students are better learners when they are actively engaged in learning (Bennett, 2001). Therefore, student-centred methods that involve active learning tend to correlate positively with better academic performance outcomes (Stes et al., 2010). These methods enhance students' experiences and help them integrate and analyse information in ways that lectures and in-class activities alone cannot (Lawson, 2014). In a study that explored the effectiveness of a universal course design in an occupational therapy curriculum, it was found that occupational therapy students who received multiple and flexible methods of teaching, such as course application through labs and fieldwork, gained a better understanding of the information than students who only received the traditional lecture-based approach (Simmons, Willkomm, & Behling, 2010).

First-year students are generally not aware of the major environmental impact of mobility technology on the lives of people with disabilities. By enabling students to physically experience everyday environmental barriers, they gain a better understanding of the challenges of accessibility for people with disabilities and are more motivated to look for solutions (Block et al., 2005). To this end, several studies have had students use wheelchairs for their mobility. This not only increased the students' awareness of the ramifications of disability but also increased the students' understanding of the importance of accessibility (Grayson & Marini, 1996; Kirby, Crawford, Smith, Thompson, & Sargeant, 2011). Moreover, it has been reported that students who have participated in field work among people with various disabilities claim an understanding of disability as a complex construct involving family and societal groups, occupations, physical environment, and attitudes. Importantly, these students better understood the concept that environmental barriers are a cause for separation from the social milieu and context (Gitlow & Flecky, 2005; Merzel & D'Afflitti, 2003).

In summary, the literature supports the need for developing educational strategies that include both theoretical and practical approaches in a learning process intended to facilitate the students' awareness, raise their levels of competence and knowledge, and arouse their interest in the subject of accessibility for people with disabilities. Hence, the purpose of this study was to investigate whether incorporating environmental assessments for accessibility (outside class), as part of an "Activity Analysis" course, would be effective in enhancing students' knowledge and feelings of competence, awareness, and interest in accessibility issues for people with disabilities. Specifically, the study addressed the following research questions:

1. Was there a difference in knowledge, competence, awareness, and interest in accessibility in occupational therapy students who had experienced the out-of-class training and those who had not experienced the out-of-class training (control group)?
2. Was there a difference in students' achievements in courses that required knowledge of accessibility in those who had experienced the out-of-class training and those who had not?

Methods

Study design

This was a prepost study design: questionnaires were administered prior to the Activity Analysis course and on

completion of the course. The control group did not perform the out-of-class training.

Participants

Overall, 102 occupational therapy students attending their 1st year of study for a BA degree at the university participated in this research. Their age range was 20—40 years (mean age 23.5 years, standard deviation 3.28) and they included 100 women and two men. There were 46 students in one academic year and 56 students in the following academic year. The former group attended the regular Activity Analysis course, while the latter group attended the same mandatory Activity Analysis course but with the additional out-of-class training in keeping with the educational philosophy of active learning (Jakee, 2011; Lawson, 2014). None of the students reported any previous experience or prior knowledge about the topic of accessibility. Two of the students in the group who were exposed to the additional out-of-class training reported having a disability (1 had a hearing impairment and 1 was poststroke due to an aneurysm).

Outcome measurement

Activity analysis: An additional out-of-class training

The curriculum for a Bachelor's degree in occupational therapy includes an Activity Analysis course in the 1st year of study. In this study we integrated the out-of-class training of accessibility into the Activity Analysis course. The Activity Analysis course applies a number of means for analysing activities and occupations. The students analyse the components of various activities, occupations, and environments, the possible meaning that these features have for clients, how the activity can be made accessible, and their therapeutic potential. During the course, students practice activity analysis within the classroom by investigating motor, sensory, and mental client factors in relation to a given activity.

In this study, we added two sessions to this course: the first was a lecture given to the class about accessibility, and the second was an out-of-class training that included an environmental assessment for accessibility. The latter allowed the students to practice a broad activity analysis of accessibility features outside of the classroom. The students, together with their lecturers (the authors of this paper), explored a typical community environment, during which a specific checklist was used for assessing levels of accessibility by measuring and documenting them. The checklist was based on local regulations that covered all of the elements designated for examination (i.e., parking places, signposting, physical structures, furniture, websites, and utility accessories). The answers were either "yes" or "no" and full accessibility was defined by each aspect of that element having received a "yes" score. In preparation for this experience, the lecturers approached nonprofit agencies in the community which promote accessibility for people with disabilities. It was agreed upon by those agencies that students were granted access to explore cafes in the community and document the conditions they found. Following this agreement the students embarked on the actual assignment. Their reports were then made available to the nonprofit agencies in order to share the information among those with disabilities as well as with the general public.

The Accessibility-Knowledge Competence Awareness and Interests questionnaire

In order to assess the contribution of the additional out-of-class training, we developed the "Accessibility-Knowledge Competence Awareness and Interests" (A-KCAI) questionnaire. The A-KCAI was based on previous questionnaires that were used at the university to receive students' feedback on courses. It was designed to assess 1st-year occupational therapy students' knowledge and their levels of competence, awareness, and interests regarding accessibility for people with disabilities. The A-KCAI consisted of 16 items that cover various topics relating to accessibility, such as physical structures, access to different services, and knowledge of the local laws on accessibility. The questionnaire covered three categories: (a) knowledge and level of competence (4 questions plus 1 4-part question), (b) awareness (8 questions) and, (c) interest in the subject of accessibility for people with disabilities (2 questions). It also included one stand-alone question for evaluating the relevance of using a checklist in learning about accessibility. Each item was scored on a Likert scale of 1—5, where higher scores indicated greater knowledge, higher levels of competency, and greater awareness and interest in the various aspects of accessibility for people with disabilities. The A-KCAI had an electronic form which the students were asked to fill online. The participants also provided demographic information, including age, sex, and previous experience in the field of accessibility.

The A-KCAI questionnaire was evaluated by experts in accessibility who determined its validity and confirmed that it was suitable for its designated use in this study. Analysis of data gathered in this study revealed that the A-KCAI had good internal consistency reliability (Cronbach's coefficient alpha ranges between .54 and .78) and good temporal stability (intraclass correlation coefficient .54—.77).

Procedures

First-year students received a detailed explanation from the course lecturers (the authors of the paper) about the study objectives. The lecturers explained that since the students' reports would be made available for use by nonprofit agencies, the project would contribute to the community. Students in one academic year were not exposed to the additional out-of-class training but attended the regular Activity Analysis course while students from the following academic year experienced the additional out-of-class training within the Activity Analysis course. Both student groups filled out the A-KCAI questionnaire online within the 1st week of the Activity Analysis course and once again at the end of the semester after completing their course assignments (an academic year separating the 2 groups). The forms were identified by identification numbers. In order to minimise the sense of obligation on the students' part to enrol in the study, the students did not receive grades on filling out the A-KCAI

and they filled the forms in their own time and in private (e.g., at home, in the dorms, or at their place of work). For the comparison of grades of two other courses where knowledge of accessibility is required, "Assistive Technology" and "Occupational Therapy in Physical Dysfunction" grades were taken from the department's grading system. These two courses were taught by two different lecturers (not the authors) who were unaware of the students' out-of-class training. Both courses were evaluated and grades were awarded the same way in both academic years. The study received ethics approval from Tel Aviv University, Tel Aviv, Israel.

Data analysis

SPSS version 17 (SPSS Inc., Chicago, IL, USA) was used to process the data. The level of significance for comparing the A-KCAI scores before and after the out-of-class training was set at .003. Since the questionnaire included 16 questions, a Bonferroni correction was required (.05/19, as 1 question had 4 parts). The intraclass correlation coefficient was calculated to determine the A-KCAI's reliability. The level of significance for comparing students who experienced the out-of-class training to the control group was .05.

The Wilcoxon signed ranks test was calculated to test the differences in students' knowledge and levels of competence, awareness, and interest in the subject of accessibility for people with disabilities before and after attending the Activity Analysis course.

The Mann–Whitney *U* analysis was calculated to compare the results of the three categories of the A-KCAI between the students who experienced the out-of-class training and the control group. Independent *t* tests were used to analyse the differences in students' achievements in courses (Activity Analysis, Assistive Technology, and Occupational Therapy in Physical Dysfunction) between the students who experienced the out-of-class training and the control group.

Results

According to a comparison of students' answers to the A-KCAI questionnaire before and after completing the course ($p = .003$), their knowledge, competence levels, and partial awareness of the issues regarding accessibility for people with disabilities increased considerably in students who experienced the out-of-class training. There was no significant difference between the students' interest levels or in their answers to most of the awareness questions on accessibility before and after the accessibility project. The detailed questionnaire is presented in order to provide an overall picture of the full questionnaire. The results are displayed in Table 1.

There was no significant difference in the A-KCAI results of the control group before and after the Activity Analysis course (data not shown).

There was no significant difference in the level of knowledge, competence, awareness, and interest levels of occupational therapy students between the two groups before starting the Activity Analysis course. However, there was a significant difference in the levels of knowledge and competence of students who experienced the out-of-class training in comparison to the control group after completing the Activity Analysis course ($p < .001$). The results are detailed in Table 2.

Results of the comparison between students who experienced the additional out-of-class training and those who did not experience it, revealed that students' achievements in both the Assistive Technology course and the Occupational Therapy in Physical Dysfunction course were significantly higher for students who experienced the out-of-class training ($p < .01$ and $p < .05$, respectively). There were no significant differences between the two groups in the final grade of the Activity Analysis course. The results are displayed in Table 3.

Discussion

The exposure of occupational therapy students to a comprehensive accessible experience at an early stage of their studies contributed considerably to promoting their knowledge and level of competence in issues involving accessibility for people with disabilities. However, the practical experience contributed less to promoting their awareness of these issues and it failed to stimulate their interest in this subject. Nevertheless, the results suggest that the additional out-of-class training contributed to the students' achievements in their Assistive Technology and Occupational Therapy in Physical Dysfunction studies where knowledge of accessibility issues is required, as was demonstrated by the significant improvement in their grades on these courses. The combination of subjective perception (the students' self-report revealed by the A-KCAI) and objective parameters (quantitative grades in the courses) has thus validated the contribution of the out-of-class training as a learning tool in promoting the understanding of environmental barriers that people with disabilities face daily.

Knowledge and level of competence

In this study, the students felt more competent in conducting an accessibility survey and filling in a checklist for reporting on the accessibility of several elements in the environment, including parking lots, restaurants, and buildings. They also felt that they now had the basic tools to make recommendations about accessibility issues. The new teaching experience also contributed to their knowledge of the laws and regulations concerning accessibility. Moyers and Hinojosa (2003) stated that we, as occupational therapy educators, have a responsibility to offer learning experiences that provide students with the knowledge and skills to enable them to enhance their clients' participation in everyday activities, as well as to understand the complexity of disability in affecting the lives of clients and families.

Enabling participation by engagement in everyday activities is considered one of the main goals in occupational therapy (American Occupational Therapy Association, 2014). When participation in occupations is barred, confined, restricted, or excluded then occupational

Table 1 The Difference in Occupational Therapy Students' Response to the Accessibility-Knowledge Competence Awareness and Interests Questionnaire Before and After the Course ($N = 56$).

Item preceded by "To what extent…"	Mean	SD	Z	Asymp. sig. (2-tailed)
Knowledge & competence				
Are you capable of filling out an accessibility checklist?			−5.34	.001
Before	2.64	.99		
After	3.88	.68		
Can you evaluate parking accessibility?			−3.69	.001
Before	3.52	.85		
After	4.11	.68		
Can you evaluate the accessibility from parking place to a building entrance?			−3.71	.001
Before	3.48	.83		
After	4.00	.63		
Can you evaluate the accessibility to restaurants & coffee shops?			−4.80	.001
Before	3.30	.89		
After	4.14	.58		
Can you evaluate the overall accessibility to buildings?			−3.94	.001
Before	3.07	.85		
After	3.69	.66		
Can you compose a recommendation for the adaptation of a building for people with disabilities?			−5.57	.001
Before	2.16	.68		
After	3.15	.73		
Are you familiar with the law on accessibility for people with disability?			−5.90	.001
Before	1.98	.77		
After	3.29	.68		
Do you know which authorities are involved with accessibility issues?			−5.25	.001
Before	1.91	.61		
After	2.68	.72		
Awareness				
Is the issue of accessibility an integral part of occupational therapy?			−.744	.457
Before	4.46	.63		
After	4.54	.53		
Will a checklist enhance your ability to analyse the activities of people with disabilities?			−.99	.318
Before	4.36	64		
After	4.25	.74		
Do educational institutions have to be accessible for people with disabilities even if there are no people with disabilities currently studying there?			−3.96	.001
Before	4.11	.82		
After	4.45	.60		
Should governmental institutions have forms written in Braille?			−.74	.458
Before	4.41	.65		
After	4.48	.63		
Do the rights of an employer to employ people with disability need to be defended?			−.77	.439
Before	2.25	.76		
After	2.24	.96		
Is it important that rental car companies have cars with manual operation for people with disabilities?			−.18	.858
Before	4.02	.84		
After	3.95	.87		
Should employers be flexible with arrival time to work for people with disabilities?			−.93	.351
Before	3.43	.85		
After	3.54	.73		
Should the government subsidize the rent of an apartment for people with disabilities?			−.83	.408
Before	4.07	.73		
After	4.16	.70		

Table 1 (*continued*)

Item preceded by "To what extent…"	Mean	SD	Z	Asymp. sig. (2-tailed)
Interest				
Does experience in screening for accessibility interest you?			−.05	.960
Before	3.7	.78		
After	3.7	.85		
Are you thinking of being involved in accessibility issues?			−1.98	.048
Before	3.80	.75		
After	3.57	.78		
Stand-alone question				
Does experience in screening for accessibility contribute to this course?			−.88	.380
Before	4.00	.74		
After	4.11	.75		

Note. Asymp. sig. = asymptotic significance; SD = standard deviation.

Table 2 The Difference in the Accessibility-Knowledge Competence Awareness and Interests Between Students who Experienced the Out-of-class Training (n = 56) and the Control Group (n = 46).

Variables	Group	Mean	SD	Z
Knowledge & competence	Out-of-class[a]	3.61	0.44	−3.24*
	Control	3.24	0.61	
Awareness	Out-of-class[a]	4.14	0.33	1.82
	Control	4.27	0.39	
Interest	Out-of-class[a]	3.67	0.71	0.48
	Control	3.69	0.75	

Note. SD = standard deviation.
*p < .001.
[a] Students who experienced the out-of-class training.

injustice occurs (Kronenberg & Pollard, 2005). People with disabilities are most at risk for occupational injustice. Using an occupational justice lens may advance social inclusion of populations who routinely experience social exclusion, such as people with disabilities (Hansen, 2013; Nilsson & Townsend, 2010). Therefore, it is the responsibility of occupational therapy educators to deliver this understanding and teach how restricted accessibility can affect participation of people with disabilities. An earlier study showed that performing accessibility surveys as part of the educational process contributed to promoting knowledge of issues involved in accessibility and also increased the role of students in aiding inclusion of people with disabilities into the community (Ratzon et al., 2006).

In summary, knowledge and competence are two of the most important components of professional identity. Rose et al. (2009) reported that occupational therapists are considered to have a low sense of competence compared with other health professions. Our current study demonstrated that the out-of-class training succeeded in improving these two factors in our students' self-perception in relation to accessibility issues.

Table 3 The Difference in Students' Achievements in Courses that Require Knowledge of Accessibility Between Students who Experienced the Out-of-class Training (n = 56) and Those Who Did Not (Control Group: n = 46).

Grades	Group	Mean	SD	t(1, 100)
Activity analysis	Out-of-class[a]	89.28	5.37	−1.80
	Control	91.20	5.29	
Assistive technology	Out-of-class[a]	88.93	5.17	3.14**
	Control	83.59	11.48	
Physical dysfunction	Out-of-class[a]	84.10	7.04	2.28*
	Control	80.73	7.75	

Note. SD = standard deviation.
*p < .05.
**p < .01.
[a] Students who experienced the out-of-class training.

Awareness

The students' awareness of accessibility was partially changed after the implementation of the accessibility teaching experience. Perhaps the students in the current study began the course with relatively high levels of awareness and therefore the practical experience made only a negligible difference.

Students in Gitlow and Flecky's (2005) study commented that they had become more aware of accessibility issues through their experience. Students in their study had a slightly different experience from that of the students in our study. They actually met with people who had disabilities and this contributed to their awareness. The experiences of our students were confined to exploring the physical environment and did not include interaction with people.

Ikiugu and Rosso (2003) recognised the need for courses integrating theoretical topics and clinical practice. Students on their course demonstrated awareness of the value of contextualization by stating that occupational therapy practice must take into account context such as changes in societal values. The participants in their study seemed to have become aware of the need to be proactive in this setting and had finally developed a better understanding of the connection between theory and practice. Hence,

courses that bridge theory and practice are indeed important in raising students' awareness of issues related to the environment, but must be further developed to specifically increase students' awareness of accessibility issues for people with disabilities.

Interests

The present study's results revealed that there were no significant differences between the two groups in the students' interest levels. Promoting and developing interest among students is a challenge to all educators. Although the level of a person's interest has been found to be a powerful influence on learning, many educators do not know how to intensify their students' academic interest (Hidi & Renninger, 2006). Clearly, the content of the curriculum and the learning environment (educator, organisation) contribute to the development of the student's interest. Hidi and Renninger (2006) suggested a four-phase model of interest development which described phases of situational and individual interest in both affective and cognitive processes. According to that model, further development of the out-of-class training should focus on two things. Firstly, increase the students' interest by providing opportunities for them to ask questions, and secondly, help them feel positive about their newfound abilities to work with the content (disability/accessibility) by offering choices of tasks, and by promoting a sense of personal achievement.

Another explanation for the lack of change in students' interest in accessibility issues after experiencing the out-of-class training may be partly due to how they perceive the occupational therapy profession. The expressed primary interest of new students is in treating people, rather than issues related to the environmental challenges faced by those people (Craik, Gissane, Douthwaite, & Philp, 2001).

Students' achievements

Students' achievements in the Assistive Technology course and in the Occupational Therapy in Physical Dysfunction were higher for the group which had received the out-of-class training. These results may indicate the way students transfer knowledge from one course to the other. Students' reporting of the transfer of skills and concepts from one course to another has been described in a previous study (Lightner, Benander, & Kramer, 2008). Mestre (2002) stated: "We define transfer of learning broadly to mean the ability to apply knowledge or procedures learned in one context to new contexts." The students in our study implemented their newly acquired knowledge of disability to the contexts of assistive technology and occupational therapy in physical dysfunction. In the two courses on these subjects, the students learned how to analyse life situations of people with various disabilities and apply different adaptations. By means of the out-of-class training, the students learned to identify barriers of everyday life. Then, they sought the appropriate evaluations, treatments, and technologies that would help clients to function within the constraints of the environment.

Limitations and recommendations for future research

This study has some limitations. Firstly, the study lasted only 2 academic years; it would need to be extended over a longer period of time for the results to be validated for application to an occupational therapy curriculum. Secondly, although we had the same teaching method in both years—the out-of-class training notwithstanding—it remains possible that there might have been a researcher's bias. Perhaps unconsciously we invested more in teaching skills and knowledge regarding accessibility in the group that experienced the out-of-class training. Thirdly, information regarding any disability among participants' relatives is missing. Having a family member or a relative with a disability may have increased their awareness and affect attitudes towards people with disabilities. In addition, and purely by chance, the two students with a disability themselves belonged to the group that was exposed to the out-of-class training, which might have indirectly influenced the results. In order to generalise the study's results and conclusions more research should be carried out with students from a variety of universities. Further studies on methods to promote the students' awareness and interest in accessibility for people with disabilities are warranted.

Conclusion

The findings of the current study support the contribution of teaching 1st-year occupational therapy students the principles and practices of accessibility for people with disabilities for improving their knowledge and level of competence at this early stage of their professional lives. Incorporation of an environmental assessment for accessibility within the out-of-class training enhanced student learning and understanding of accessibility for people with disabilities. This understanding will help them in promoting the participation and inclusion of people with disabilities in community life and thus, in promoting occupational justice. Furthermore, knowledge might be transferred from the new accessibility experience to other study domains within the occupational therapy curriculum.

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