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Understanding The Role of Origami in Teaching and Applying the Activity Analysis Process in Occupational Therapy Education: A Pilot Study

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Abstract

A critical component of the occupational therapy process is activity analysis, because it helps address the clients' needs and values. Outcomes are determined by the effectiveness and meaningfulness of the activity being analyzed. As Hammell [1] argues, occupational therapy practitioners help clients navigate life after an occupational disruption. It is often a complex and challenging concept for students to understand. To capture the attention and interest of students, educators must incorporate a variety of teaching methodologies and techniques. Occupation-based learning helps facilitate self-direction and the development of critical thinking skills for problem-solving. Problem-solving and critical thinking are essential for activity analysis and treatment planning. For this study, occupational therapy educators implemented occupation-based learning to foster student learning and to help students gain a better understanding of the activity analysis process through origami. The purpose of this study was for occupational therapy students to analyze the components of origami and explore their understanding of and comfort with the activity analysis process.

Plain Language Summary

According to the Occupational Therapy Practice Framework (OTPF), activity analysis is a process used by an occupational therapy practitioner (OTP) to understand the demands of an activity. This includes understanding how those demands impact a clients' ability to participate. The activity analysis process breaks down an activity to understand the components needed for an individual to complete a task successfully. An OTP also continually modifies interventions to address underlying needs of the client to obtain goal achievement. Modifying an activity requires thinking about different alternatives to achieving a goal [2]. This is a mutual understanding that is shared between the client and OTP. Tasks are also known as interventions, which are designed to change or restore client factors or skills due to a loss or impairment resulting from a disability or injury [2]. Grading is a term used to increase or decrease the activity demands on the client while performing the activity [2]. Grading up an activity is done to increase the challenge of the activity. Grading down an activity simplifies the activity while providing assistance during difficult points to achieve success [2]. In an effort to help students understand the activity analysis process, the Occupational Therapy faculty and an Origamist (authors of this paper) created an interactive learning activity to teach students about the history and meaning of origami. The experience included making an origami crane and reviewing the activity analysis process afterwards. The authors of this paper wanted to determine if such an experience would help students better comprehend and apply the activity analysis process. They asked students to reflect on the experience and identify what they liked and did not like, what they learned, and how (if at all) the learning activity enhanced their understanding and ability to apply the activity analysis process. Overall, students found the learning experience useful and valuable. Findings from this study can help improve future teaching in occupational therapy and other healthcare fields.

Key Words: Activity Analysis, Education, Occupational Therapy Practitioner, Occupation, Origami

Introduction

Origami plays an important role in both art and science. Folding uncut sheets of paper, usually squares, has been utilized to explore new ideas, opportunities, and solutions across different disciplines. Originating from Japanese culture, origami is a form of art involving folding paper to create various shapes and designs. The word 'ori' means folding, and 'kami' means paper [3]. Around 1200 A.D. origami developed rapidly in Japan, including the creation of more complex models [4]. After 1577, origami spread to all levels of society [4]. In 1800 A.D. origami was integrated into natural science [4]. It became an important tool for teaching and research. Origami was found to be not only an activity, but a way to add educational and meaningful value to the field of art and science.

Occupational therapy practitioners (OTP) use meaningful activities to assist individuals in maximizing their independence in Activities of Daily Living (e.g., dressing, toileting, and bathing) and Instrumental Activities of Daily Living (e.g., cooking, cleaning, care of others). Through the activity analysis process, OTPs examine an activity to

identify the cognition, motor, sensory, and emotional skills utilized. Understanding these requirements is an essential component of the occupational therapy process [5]. The activity analysis helps the OTP assess and identify the skills, equipment, tools, and materials required for the activity. Being able to identify these factors allows OTPs to determine where the client may be struggling with the demands of the activity. This information helps the OTP establish clear treatment goals and strategies to assist the client with goal achievement. Findings of an activity analysis may also be used to identify suitable adaptations and modifications [6]. The activity analysis process can also help the OTP determine the potential therapeutic benefits of an activity. If an activity requires the use of skills that the client is working on, the activity may be included as part of an intervention plan.

The idea of occupational engagement impacting the health and well-being of people is the primary focus of the profession. Being able to understand the demands of all types of occupations is essential for occupational therapy practitioners and students. As the scope of practice for OTPs has broadened, new practitioners must have enhanced clinical reasoning, problem-solving, interprofessional, evidence-based practice, and leadership skills and abilities [7]. Each occupational therapy student must demonstrate competency in the activity analysis process. Understanding this process can help students break down an activity into all its components, analyze the client's overall performance, and address the diverse occupational needs of clients. This process helps identify the challenges a client may experience and areas where improvement may be made to help enhance one's quality of life. Although the activity analysis process can be challenging, it is essential to find the means of engaging a client through activities that are purposeful and meaningful.

Literature Review

Origami can be a meaningful and influential intervention that may be broken down into several components. A fun and engaging activity that addresses numerous occupational skills, origami can be applied to numerous disabilities and a wide variety of settings [8]. It is an activity that encourages freedom of expression among individuals. The activity is simple, clean, and easy to manage. Additionally, origami may be used as an intervention to address visual sequential memory, eye-hand coordination, spatial ability perception, cognitive skills, patience, perseverance, concentration, and attention. Additionally, research has shown that creating origami has a positive effect on attention span and concentration. The use of Origami has been studied among different professions due to its numerous benefits on the human body. Origami is valuable at a neuronal level, benefiting the brain [9]. Researchers have also found that origami activities correlate to good bilateral coordination. Origami may activate left hemisphere functions such as right-hand control, written and spoken language, numerical skills, reasoning, and scientific skills while also activating right hemisphere's functions like left-hand control, insight, imagination, and music and art awareness [9].

Origami in Occupational Therapy

Origami has been shown to be very useful as an assessment tool and therapeutic intervention used by different professionals, including occupational therapists, speech therapists, art therapists, psychologists, psychiatrists, and social workers [10]. An assessment is the process of data collection to identify the client's strengths and deficits. Occupational therapy interventions are designed to facilitate clients' engagement in occupations and improve health and wellbeing [2]. Origami can appeal to a wide range of ages since it is easily adapted according to the developmental stage and needs of the individual. An additional strength of origami is that it can be done almost anywhere and anytime with minimal preparation [8]. It is an inexpensive activity that can be used to assess multiple skills, such as coordination, visual sequence memory, fine/gross motor control, manipulation, and attentiveness [11].

Origami in Education

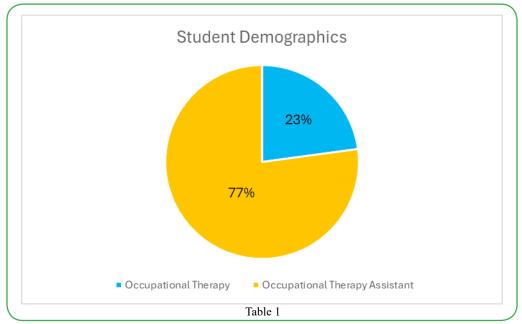
Origami has recently made its way into education. Studies have found that origami has benefited students in many ways, including the development of cognitive, social, and motor skills. It is not used just for students in primary and secondary education. For example, some higher educational institutions in Turkey have introduced optional courses related to origami to introduce this concept to future educators in Turkey [12]. The use of origami has also been applied in several professions such as engineering, architecture, furniture design, interior design, landscaping, fashion, and more [13, 14]. Using origami in the classroom helps involve students in the learning process. It requires students to concentrate their attention and use their hands to manipulate paper, which can improve fine and gross motor skills [11].

The use of origami in occupational therapy education teaches students the activity analysis process. Activity analysis breaks an activity down into its steps and its detailed subparts while examining all its components with each activity being evaluated skillfully to determine its therapeutic value [2]. This includes the underlying motor, sensory, and cognitive skills and abilities required to perform an activity. For example, there is a difference between knowing you need to grip something (a task demand) and having the hand strength to do it (a motor function) [2]. Every individual brings their own set of strengths, challenges, and experiences to an activity. This includes body functions, beliefs, values, and lived experiences. During the origami activity, students learned activity analysis to gain a comprehensive understanding of what an activity entails and how it can be modified or adapted to match one's current abilities.

Methodology

The research study was approved by the Institutional Review Board at Winston-Salem State University in Winston-Salem, North Carolina. A qualitative approach was used to capture each participant's knowledge of the activity analysis process, as well as what was challenging and beneficial about the origami learning experience. This included how, if at all, the experience enhanced their understanding of the activity analysis process. Informed consent explaining the study's purpose and that participation was voluntary was obtained from all participants. Participants were encouraged to participate or not participate without feeling pressure. They were informed that there would be no penalties for not participating or ending their participation early. Participation included completing a pre and post survey and attending the class session where the origami lesson was included. There was one open-ended question on the presurvey and five open-ended questions on the post-survey in which participants were asked to reflect on their overall experience. The researchers reviewed survey data to determine major themes within the study. This included identifying codes and categories.

This study used convenience sampling to gather students who were already enrolled in occupational therapy programs to participate in the study. Students taking classes where the origami experience was included sent pre and post surveys to complete through email and announcements through the course learning management system. They were informed in the communication that participation in the study was completely anonymous and voluntary, and that all students in the courses would participate in the origami learning activity whether they completed the surveys or not. Clicking on the survey link indicated their consent to participate. While the survey did ask for demographic information such as age, gender, and race, names were not collected. The researchers did not know who was or who was not participating in the study. No grades were attached to participation in the study. A total of thirty-five first-year occupational therapy and occupational therapy assistant students were recruited to participate in this study. Eight were occupational therapy students and twenty-seven were occupational therapy assistant students. The inclusion criteria were enrollment as a full-time, first-year student in the occupational therapy and occupational therapy assistant program. The average age of participants was 24.0 years. 1.86 percent of participants had prior knowledge of origami.



Surveys

The pre survey consisted of five demographic questions including age, gender, and whether the participant was an occupational therapy or occupational therapy assistant student. There were six quantitative questions that used a Likert scale to explore participant knowledge of origami, comfort with origami, how likely they were to use origami as a therapeutic intervention, their understanding of how to apply the activity analysis process, their understanding of the benefits of the activity analysis process, and their comfort with the activity analysis process. Two open-ended questions asking them to define the activity analysis for occupational therapy and providing them the opportunity provide additional comments regarding origami and activity analysis process were included. Post survey questions were the same as the pre survey questions, with additional open-ended qualitative questions added to look at how the origami experience may have enhanced the understanding of the activity analysis process and to obtain participant feedback about the experience. The researchers reviewed the survey data to identify codes, categories and major themes.

Pre-Survey Questionnaire

- 1. Please select if you are an OT or OTA Student
- So the research team can correlate pre/post surveys while maintaining participant confidentiality, please enter the following below

First letter of your own first name (A–Z)

First letter of your father's first name (A–Z)

First letter of your mother's first name (A–Z)

The year you were born (YYYY format)

Example: MJA1996

- 3. What is your age?
- 4. What is your gender?

Man

Woman

Non-Binary

Prefer not say

What is your race? Select all that apply

African American/Black

Asian

Hispanic/Latino

Native American

White/Caucasian

Prefer not to say

- 6. What is your knowledge of origami on a scale of 1 to 5? 1 being not having any knowledge at all, 5 being very knowledgeable
- 7. What is your comfort with origami on a scale of 1 to 5? 1 being not comfortable at all, 5 being very comfortable
- 8. How likely are you to use origami as a therapeutic intervention?

Somewhat likely

Somewhat Unlikely

Very Likely

Neither Likely or Unlikely

Very Unlikely

9. I understand how to apply the activity analysis process?

True

False

Unsure

Other

10. I understand the benefits of the activity analysis process?

True

False

Unsure

Other

- 11. How comfortable are you with the activity analysis process on a scale of 1-5? 1 being not comfortable at all, 5 being very comfortable?
- 12. In 2-3 sentences define the activity analysis process for occupational therapy
- 13. Please add any additional comments you may have about origami and/or the activity analysis process

Post-Survey Questionnaire

1. What is your age?

2. What is your gender?

Man

Woman

Non-Binary

Prefer not to say

What is your race? Select all that apply

African American/Black

Asian

Hispanic/Latino

Native American

White/Caucasian

Prefer not to say

- 4. What is your knowledge of origami on a scale of 1 to 5? 1 being not having any knowledge at all, 5 being very knowledgeable
- 5. What is your comfort with origami on a scale of 1 to 5? 1 being not comfortable at all, 5 being very comfortable
- 6. How likely are you to use origami as a therapeutic intervention?

Somewhat likely

Somewhat Unlikely

Very Likely

Neither Likely or Unlikely

Very Unlikely

7. I understand how to apply the activity analysis process?

True

False

Unsure

Other

8. I understand the benefits of the activity analysis process?

True

False

Unsure

Other

- 9. How comfortable are you with the activity analysis process on a scale of 1-5? I being not comfortable at all, 5 being very comfortable?
- In 2-3 sentences define the activity analysis process for occupational therapy
- 11. What did you find most challenging about the origami learning experience and why?
- 12. What did you find most beneficial about the origami learning experience and why?
- 13. How did the origami learning experience enhance your understanding of the activity analysis process, if at all?
- 14. Please add any additional comments you may have about origami and/or the activity analysis process

Origami Experience

Participants in courses where the Origami Experience was implemented (foundational Occupational Therapy/Occupational Therapy Assistance courses) had a virtual guest lecture and guided hands-on origami practice experience. The Origamist presented through Zoom while the students and instructors/members of the research team were on campus. The guest lecturer, an Origamist, discussed the history of origami, provided basic information on origami and origami steps, and discussed ways origami can be graded before leading a hands-on origami practice experience. The origamist had students make a simple crane with origami paper the research team provided. Breaking down each step, he demonstrated and guided participants through the process while also responding to questions and fostering an inclusive learning environment throughout the process. The experience was adapted and modified for each participant to maintain mastery of making an origami crane.

To help students achieve competency, the origamist repeated steps several times. He continuously checked and provided feedback to participants before moving on to another step to help ensure the correctness of each fold. Participants were allowed and encouraged to go to the monitor, show their work and ask questions. In addition, members of the research team walked around and provided assistance as needed. During the process of making the crane, students were asked to carefully think about the steps and the physical and cognitive skills required to complete each step. They were asked to reflect on how the activity of making the simple crane could be graded up, graded down, or adapted to meet client needs. Examples included using different types of paper to make it easier or harder, using paper with one color versus multiple colors to adjust the degree of challenge, and using various tools like a ruler to assist with the folds as needed. The experience follows Kolb's Experiential Learning Theory [15]. The Concrete Experience Stage included the lecture and making of the crane. The Reflective Observation Stage was encouraged when the students were asked to reflect upon the steps required to complete each stage of the crane and how the activity could be graded up or down. The overall experience was geared to lead students to the Abstract Conceptualization Stage, where they had new learning about the activity analysis process through the origami experience. This new learning could then lead them to the Active Experimentation Stage, where they they have the ability to implement and apply their new learning in coursework and with clients they worked with.

Data Analysis

A thematic analysis approach was used to look at participant perceptions of the origami learning experience to help determine if it helped enhance student understanding of the activity analysis process. The different analysis tools used in this study were Microsoft Excel/ Forms and Zoom platforms. Microsoft Forms was used for the pre/ post survey that researchers created. The pre-survey included Likert scale questions and two open-ended questions relating to questions about understanding of and comfort with the origami and activity analysis process. The post-survey included Likert scale questions and five open-ended questions to capture the participants' learning experience. Microsoft Excel was used for data interpretation of survey results to be able to clearly identify the options participants selected on the Likert scale questions. The qualitative data from the survey questions were analyzed through content analysis to identify common themes. The sample size was relatively small so the authors hand-coded the data using a word-based technique to identify recurring terms across responses. To improve credibility, the authors coded the responses independently, looked for common terms, and then compared their findings for discrepancies. The authors further discussed and solved the discrepancies and cooperatively came to an agreement on the best terminology to describe each theme.

Results

Participants identified the activity analysis as an essential process for breaking down and understanding the components of an activity. By analyzing the steps involved in completing an activity, participants reported that they gained clarity on what was required in terms of resources, time, skills, and tools. This process is pivotal for optimizing efficiency and ensuring quality task execution. One participant reported on their survey that "Seeing how important it is to have detailed steps" helped enhanced their understanding of the activity analysis process. Another participant summed up what many participants indicated when they said, "I got to learn the basic steps, practice the basic steps and see the meaning behind it to others. This helped me with understanding the activity analysis process because I was acting it out." By paying close attention and focusing on detailed steps, participants stated that they were able to connect cognitive processes (like following instructions and problem-solving) with motor skills (such as hand-eye coordination and finger dexterity). These connections highlight how learning activities like origami

can integrate different aspects of learning and skill development, from the mental process of understanding the steps to the physical actions of folding and manipulating the paper. An appreciation for origami was also expressed by participants, with sentiments such as, "I love Origami and find it interesting and rewarding," "I think it is beautiful," and "Origami can improve someone's quality of life."

The origami experience was found to enhance participants' understanding of the activity analysis process by encouraging them to follow a structured sequence of steps, which mirrors the way activities are broken down in occupational therapy. Participants were educated on how to grade an activity up/down or modify an activity to help provide the right challenge for the clients' skill level and ability through the use of origami. They learned how to match the clients' cognitive and physical abilities to help ensure successful task completion. One participant stated that "The process allowed me to see firsthand the method of grading the activity based on the needs of the participant." By carefully following each step, participants learned to appreciate the importance of sequencing in any task, as well as the relationship between individual actions and the overall outcome.

Participants reported that observing how other students approached the same activity helped them gain insights into alternative methods for completing a step, as well as new problem-solving strategies. This peer learning reinforced their understanding and broadened their perspective on how to approach complex tasks and processes.

The environment was found to be the most challenging aspect of the origami learning experience. Participants reported that it was not conducive to learning and performing Origami efficiently. Due to the limitations of a virtual setting, the lack of direct, hands-on guidance from the instructor created difficulty in understanding the proper technique. Participants described that it was challenging to learn from someone who was virtual, rather than in person. They indicated that it would have been helpful for someone who had experience in Origami to be present to assist with making the correct folds. In addition, participants indicated a handout with visual and written step-by-step directions on how to complete each fold would have been helpful. Connectivity and video quality issues during the Zoom session interfered with clearly seeing the instructor's hands or the paper being folded, leading to misunderstanding the necessary folding steps. These environmental barriers created frustration and slowed down progress, as participants could not directly observe the folds or ask questions face to face. This confused students, who may have made mistakes without realizing them, requiring them to backtrack or rush through steps. These challenges potentially lead to incomplete or incorrect results.

Discussion

OTPs believe that an individual can improve their physical, cognitive, and social participation skills through meaningful and purposeful activities. Meaningful, purposeful activities can be used by OTPs to help increase client function. This includes taking into account the client's occupational history, preferences, goals, and needs [16]. Applicable in both clinical and academic settings, an occupational therapy educator has the same responsibility as a clinician to develop and implement student-centered learning. Active learning methods and techniques have been found to lead to stronger academic performance outcomes [17]. This pedagogy allows students to integrate and analyze information more effectively. Occupational therapy educators have a responsibility to ensure that what is taught in occupational therapy education meets students' learning needs.

Literature supports the use and development of educational strategies that involve theoretical and practical approaches to facilitate increased student awareness, knowledge, and ability to adapt interventions [18]. Activity analysis courses and learning activities, such as the origami lesson implemented as part of the current study, have been

found to be effective in increasing student knowledge, awareness, sense of competence, and interest in addressing the accessibility needs of individuals with disabilities [18].

The activity analysis process is often taught as part of foundational courses in occupational therapy programs, during which students develop and learn about the concepts of occupational therapy. Other courses within the curriculum usually build on these concepts to meet course learning objectives. Students learn how to analyze the human and non-human components that are required to engage in occupations that help fulfill their identity. Occupational engagement is a fundamental human behavior that is explored and analyzed. Students examine the complexity of occupational engagement and determine the demands of daily activities. Understanding an activity requires one to examine the physical and cognitive components that may impact health, occupational engagement, and therapeutic outcomes. For the learning activity implemented in this study, Origami required students to focus, follow instructions to produce the expected outcome, and persevere through challenges. They were required to actively engage and apply many skills, promoting their creativity, problem-solving skills, and ability to adapt. Being able to adapt and modify therapeutic activities is an essential part of the occupational therapy process. Understanding these concepts is necessary to be successful on fieldwork and as an OTP. Participants' understanding of the activity analysis was found to improve, largely due to being able to practice and receive feedback. The learning experience helped them see how the activity analysis process is used to determine the skills required to complete an activity (e.g., physical, emotional, and. cognitive skills), to determine whether an activity could be of therapeutic value to a client, or to explore where there may be a breakdown between the skills required to successfully complete the activity and the client's abilities. The activity analysis can be used to help develop client-centered goals and treatment plans, and/or to find ways to adapt the activity or environment to facilitative maximal participation. This idea is reinforced throughout the curriculum when discussing evaluations and intervention planning.

Conclusion

The purpose of the current research study was to determine whether an origami learning experience helped occupational therapy and occupational therapy assistant students better understand the activity analysis process. Results indicate that participants felt better able to identify the physical and cognitive components of an activity when conducting an activity analysis, and more prepared to apply findings to address client needs. Having different learning needs and styles when compared to adolescents, adult occupational therapy students can benefit from a variety of alternative methods of teaching [19] like the origami learning experience. The experience produced a higher-level learning outcome and the opportunity to practice a new activity, receive immediate feedback, compare results with peers, and collaborate in dyadic groups. This helped facilitate student learning and understanding of the activity analysis process. Origami is a student-centered learning experience that improves creativity and offers fun but challenging conditions which provide an occupationbased learning experience [20].

Limitations

The limitation of this study was the small sample size. There were thirty-five students enrolled as first-year students in the Department of Occupational Therapy at Winston-Salem State University and Rowan-Cabarrus Community College. Conducting origami instruction virtually presents several challenges that can hinder effective learning. Common issues include students' ability to follow the instructor's speed, leading to confusion and frustration. Visibility due to limited camera angles or poor lighting made it difficult for students to see the instructor's hands and the folding process. Audio quality impedes understanding verbal instructions. Internet Connectivity: Technical issues like lag or disconnections disrupted the flow of the session.

Implications for Further Research

More research is warranted to determine the impact of occupation-centered learning. Research in these areas could benefit future leaders in the rehabilitation profession and patient care. Research is needed to understand what aspects of student education were most helpful for increasing their understanding of activity analysis and occupation. Determining specific teaching methods and approaches educators used to implement occupation-centered education in the classroom, are critical before students enter their level II fieldwork. Understanding student perspectives on what helps them to comprehend the concept of occupation could also be useful in supporting curriculum design and education approaches.

The Knowledge Take Away

This article describes the impact of an interactive learning activity on the application of activity analysis. The experience utilized unique interactive instructional strategies through the use of Origami. Not only does Origami address skills like fine/gross motor coordination, vision, and tactile skills, it was found to be useful in teaching occupational therapy students the importance of and understanding of the activity analysis. This includes modifying or grading an activity up or down to meet the clients' skill level.

Competing Interests: The authors of this research declare no competing interest regarding this study.

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Example of an Activity Analysis for Making an Origami Crane

- Step- Fold the origami paper in half vertically
- · Functions Required
 - o Mental Functions: Sustained Attention, Working Memory
 - o Sensory Functions: Vision, Proprioception
 - o Movement & Movement Related Functions: Joint Mobility, Eye-Hand Coordination
- Muscular Analysis of Movement Required
 - o Elbow internal rotation, Finger Flexion
- Body Structures Required
 - o Bones and muscles of the hand
- Performance Skills Required
 - o Motor: Manipulates, Paces, Coordinates
 - o Process Skills: Attends, Notices/Responds
- **Please note this lists a few aspects of the activity analysis, it does not represent a completed activity analysis