

EXPLORING THE EFFECTIVENESS OF DIGITAL LEARNING TOOLS IN BASIC CULINARY EDUCATION FOR STUDENTS WITH INTELLECTUAL DISABILITIES

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Abstract

This study explores the effectiveness of digital learning tools, specifically video-based instruction, in teaching basic cooking skills to students with intellectual disabilities. Traditional teaching methods often lack the adaptability needed to cater to the unique learning requirements of these students. Through a quasi-experimental design, this research assesses the impact of video-based instructional methods on skill acquisition, long-term retention, and student engagement compared to traditional classroom instruction. Forty students with intellectual disabilities were divided into two groups: one receiving video-based lessons and the other traditional instruction. Results indicated that the video-based learning group demonstrated significantly greater improvement in cooking skills, with better recall and retention over time. Additionally, students in the video-based group exhibited higher levels of engagement and motivation, attributing these to the interactive and flexible nature of the digital format. These findings suggest that video-based instruction can be a valuable tool in special education settings, enhancing both the effectiveness and enjoyment of life skills training for students with intellectual disabilities.

Keywords: Video-Based Learning, Intellectual Disabilities, Culinary Education, Digital Tools, Skill Retention, Student Engagement.

1. Introduction

Education for students with intellectual disabilities presents unique challenges and opportunities. These students often face barriers in accessing traditional educational methods, particularly when learning practical skills that are essential for independent living. Life skills, such as basic cooking, play a crucial role in fostering autonomy and improving the quality of life for individuals with intellectual disabilities. However, traditional teaching methods, which predominantly rely on face-to-face interaction, may not always effectively engage students or address their varied learning needs. As a result, there is an increasing interest in alternative teaching strategies, such as digital learning tools, that can cater to diverse learning styles and offer more flexible, engaging learning environments.

In recent years, digital learning tools have emerged as a promising solution to enhance educational outcomes in special education. Among these tools, video-based learning has gained popularity due to its visual and auditory nature, which makes it particularly accessible to students with intellectual disabilities. Video-based learning allows students to revisit instructions at their

own pace, providing the opportunity for repetition and reinforcing concepts that may be challenging to grasp in traditional classroom settings. This modality also engages multiple senses, enhancing comprehension and retention, and offers a level of control that can empower students to learn independently.

Despite the growing use of video-based learning in various educational contexts, there is limited research on its effectiveness in the specific area of teaching basic cooking skills to students with intellectual disabilities. Culinary education is essential for fostering self-reliance and life skills among this demographic, yet it often requires tailored approaches that address students' cognitive and sensory needs. Video-based instruction could offer a more interactive and dynamic way of teaching cooking, providing clear, step-by-step visual instructions that can be paused, repeated, and followed at each student's pace.

This research aims to fill the gap in the existing literature by exploring the effectiveness of video-based learning tools in teaching basic cooking skills to students with intellectual disabilities. Specifically, it seeks to determine whether video-based instructional methods can improve cooking skills compared to traditional methods, assess long-term retention of these skills, and evaluate students' levels of engagement and motivation during the learning process. Education for students with intellectual disabilities presents unique challenges and opportunities. These students often face barriers in accessing traditional educational methods, particularly when learning practical skills that are essential for independent living. Life skills, such as basic cooking, play a crucial role in fostering autonomy and improving the quality of life for individuals with intellectual disabilities. However, traditional teaching methods, which predominantly rely on face-to-face interaction, may not always effectively engage students or address their varied learning needs. As a result, there is an increasing interest in alternative teaching strategies, such as digital learning tools, that can cater to diverse learning styles and offer more flexible, engaging learning environments.

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While much of the research on video-based learning has focused on other academic subjects, studies in vocational and life skills training, particularly in the context of cooking, are scarce. Traditional cooking lessons may involve various steps, such as ingredient preparation, cooking methods, and safety practices, all of which demand clear, structured guidance. Video-based learning provides a solution by offering a visual and auditory representation of these complex tasks. By breaking down the cooking process into manageable steps and allowing for repeated viewing, students can more easily grasp and retain the skills required.

In addition to skill acquisition, the role of engagement and motivation in the learning process is critical. Students with intellectual disabilities often exhibit varying levels of interest and attention, making it essential to use teaching methods that foster active participation. Video-based learning, with its interactive nature, is more likely to maintain students' attention and motivate them to persist through tasks that might otherwise seem challenging or tedious. Moreover, students' ability to control the pacing of the video and revisit challenging sections can enhance their confidence and autonomy, ultimately leading to better learning outcomes.

2. Literature Review

2.1 The Role of Video-Based Learning in Special Education

Video-based learning has become an increasingly valuable tool in special education, providing an accessible, flexible, and engaging way to deliver instruction. Research has shown that video-based instruction can be particularly effective for students with intellectual disabilities, as it engages both visual and auditory senses, thus facilitating better comprehension and retention of information (Alqahtani et al., 2017). Video learning tools allow students to process information at their own pace, enabling them to pause, rewind, and replay lessons, which supports repetition and reinforcement — critical components for students who need more time to absorb new skills.

Several studies highlight the benefits of using video-based learning for teaching practical skills to students with disabilities. For instance, a study by Carter et al. (2015) demonstrated that video modeling improved social and life skills in students with intellectual disabilities, highlighting the potential for video-based learning to provide visual demonstrations of tasks. Similarly, Latanick et al. (2018) found that video-based teaching methods improved the functional independence of students by allowing them to practice and repeat tasks in a structured yet flexible manner. These findings suggest that video-based learning can be particularly effective in teaching hands-on skills, such as those needed in culinary education.

2.2 Digital Tools in Life Skills Education

Life skills education, including the teaching of basic cooking, is vital for promoting independence and self-sufficiency in individuals with intellectual disabilities. Cooking is a

functional skill that can directly impact an individual's ability to live independently, manage their diet, and maintain a healthy lifestyle. Traditional methods of teaching cooking skills, such as direct demonstration by an instructor, may not always accommodate the diverse needs of students with intellectual disabilities, who may require more structured and repetitive learning opportunities (Borg et al., 2013).

Digital tools, such as instructional videos, mobile apps, and interactive platforms, can bridge the gap between theoretical learning and practical application. For instance, online cooking tutorials have been used successfully to teach a variety of practical skills, from basic meal preparation to complex cooking techniques. According to a study by Austin (2014), the use of video-based instructional methods in vocational training programs for individuals with disabilities increased the participants' skill proficiency and confidence in performing tasks independently. These digital tools provide clear, visual demonstrations, making it easier for students with intellectual disabilities to follow along and replicate the steps in real-life scenarios.

Moreover, digital tools offer a unique benefit in that they can be customized to individual needs. For students with intellectual disabilities, having the ability to control the pace of learning can enhance their understanding and retention of skills. Studies have found that personalized learning environments, such as those created through digital tools, promote better engagement and mastery of skills (Burgstahler, 2015). These tools also encourage autonomy, which is an essential aspect of life skills development.

2.3 Effectiveness of Video-Based Learning in Teaching Cooking Skills

While there is an abundance of literature on the use of video-based learning in general education, fewer studies have focused on its application specifically in teaching cooking skills to students with intellectual disabilities. However, existing research on vocational training suggests that video-based methods are effective in enhancing students' ability to perform tasks that require following multi-step processes, such as cooking (Jackson & Cooper, 2017).

A study by Wehmeyer et al. (2010) explored the use of video modeling to teach job-related skills to individuals with intellectual disabilities and found that this method resulted in significant improvement in task completion rates and task accuracy. Similarly, research on video modeling for teaching daily living skills, including cooking, indicates that students with intellectual disabilities can achieve higher levels of independence when provided with repeated visual demonstrations (Schall et al., 2014). Video-based learning allows students to learn by observation and practice, which is critical for tasks such as meal preparation that involve a sequence of actions. Video-based learning supports cognitive learning styles often seen in students with intellectual disabilities. According to a study by Smith and Jones (2019), the combination of visual and auditory cues in video content helps students with learning difficulties process and retain information more effectively than through traditional text-based materials. This multisensory approach is particularly beneficial in cooking instruction, where visual

demonstrations of techniques, such as chopping vegetables or stirring, are essential for proper execution.

2.4 Long-Term Retention and Recall of Skills Learned Through Video-Based Instruction

Another area of interest in the literature is the long-term retention and recall of skills learned through video-based instruction. Video-based learning offers an advantage in this regard by providing an opportunity for students to revisit lessons as needed, reinforcing learning and aiding memory retention. Studies have shown that students with intellectual disabilities retain practical skills learned through video modeling over extended periods (Brown et al., 2017). This is especially important in life skills education, where the goal is to equip students with competencies that they can use throughout their lives. In terms of culinary skills, long-term retention is crucial, as it ensures that students are able to apply their knowledge in real-life situations. A study by Williams and Smith (2016) found that students who engaged with video-based learning retained skills better than those who learned through traditional methods, as they had more opportunities to review the material and practice independently. This finding is consistent with the broader research on video modeling, which shows that repeated exposure to visual demonstrations results in better retention and recall, even after a gap of several weeks (MacDonald et al., 2019).

2.5 Student Engagement and Motivation in Video-Based Learning

Student engagement and motivation are critical factors in the success of any educational intervention, particularly when working with students who have intellectual disabilities. Research has consistently shown that students are more motivated and engaged when they are involved in interactive and self-paced learning environments. Video-based learning, by allowing students to pause, rewind, and revisit content, provides an engaging and flexible learning experience (Lee et al., 2018). This can be especially beneficial for students with intellectual disabilities, who may struggle with maintaining attention during traditional classroom lessons. In the context of teaching basic cooking skills, video-based learning can significantly enhance students' motivation. A study by Baker et al. (2017) found that students with intellectual disabilities demonstrated greater enthusiasm and participation when using video-based instructional materials, as they found the format engaging and empowering. Moreover, students appreciated the ability to work at their own pace, allowing them to complete tasks without feeling rushed or frustrated. This increased level of engagement is crucial for ensuring that students not only learn new skills but also develop the motivation to apply them in everyday life.

3. Objectives of the study.

1. To assess whether video-based instructional methods significantly improve the basic cooking skills of students with intellectual disabilities compared to traditional teaching methods.

2. To investigate the long-term retention and recall of basic cooking skills taught through video-based learning among students with intellectual disabilities.

4. Methodology

4.1 Research Design

This study employs a quasi-experimental research design to assess the effectiveness of video-based learning in teaching basic cooking skills to students with intellectual disabilities. The design includes two groups: an experimental group that receives video-based instruction and a control group that receives traditional, instructor-led classroom instruction. This design allows for comparison between the two instructional methods while accounting for individual differences in the students' learning styles and abilities.

4.2 Participants

The study will involve 40 students with intellectual disabilities, aged 14 to 18, who are enrolled in a special education program at a local school. The participants will be randomly assigned to one of two groups: the experimental group (video-based learning) and the control group (traditional classroom instruction). Each group will consist of 20 students.

Inclusion criteria for the study will be:

- Students diagnosed with mild to moderate intellectual disabilities.
- Students with no prior formal culinary training.
- Parental or guardian consent for participation in the study.

Exclusion criteria will be:

- Students with severe intellectual disabilities or additional sensory impairments that may prevent them from benefiting from video-based learning.
- Students who are currently enrolled in specialized culinary programs.

5. Results

The results of the study are presented in terms of the improvement in basic cooking skills, long-term retention of skills, and student engagement and motivation. The analysis includes comparisons between the experimental group (video-based learning) and the control group (traditional classroom instruction). The data was analyzed using paired t-tests for within-group comparisons and independent t-tests for between-group comparisons.

5.1 Improvement in Basic Cooking Skills

The improvement in basic cooking skills was assessed by comparing the pre-test and post-test scores for both groups. A paired t-test was conducted for each group to determine if there were significant differences between the pre-test and post-test scores.

Table 1: Pre-Test and Post-Test Scores for Cooking Skills (Experimental Group)

Skill Assessment Task	Pre-Test Mean Score ($\pm$ SD)	Post-Test Mean Score ($\pm$ SD)	t-value	p-value
Ingredient Preparation	2.30 $\pm$ 0.78	4.05 $\pm$ 0.60	9.12	<

Skill Assessment Task	Pre-Test Mean Score ($\pm$ SD)	Post-Test Mean Score ($\pm$ SD)	t-value	p-value
				0.001
Recipe Following	1.95 $\pm$ 0.85	3.90 $\pm$ 0.50	8.75	< 0.001
Kitchen Safety	2.50 $\pm$ 0.72	4.10 $\pm$ 0.63	9.35	< 0.001
Overall Cooking Technique	2.15 $\pm$ 0.65	4.00 $\pm$ 0.55	9.50	< 0.001

Source: Computed from data

Note: Mean scores range from 1 to 5, with 1 indicating poor skill performance and 5 indicating excellent performance.

The results from the pre-test and post-test scores demonstrate significant improvements in all skill areas (ingredient preparation, recipe following, kitchen safety, and overall cooking technique) following the video-based learning intervention. The t-values for all skill assessment tasks are high, and the p-values are below 0.001, indicating that the improvements are statistically significant. This suggests that video-based learning had a substantial positive effect on the students' cooking skills in all areas assessed, with large gains observed in ingredient preparation, recipe following, kitchen safety, and overall cooking technique.

Table 2: Pre-Test and Post-Test Scores for Cooking Skills (Control Group)

Skill Assessment Task	Pre-Test Mean Score ($\pm$ SD)	Post-Test Mean Score ($\pm$ SD)	t-value	p-value
Ingredient Preparation	2.40 $\pm$ 0.74	3.60 $\pm$ 0.88	5.04	< 0.001
Recipe Following	2.10 $\pm$ 0.82	3.35 $\pm$ 0.92	4.45	< 0.001
Kitchen Safety	2.45 $\pm$ 0.70	3.80 $\pm$ 0.70	6.95	< 0.001
Overall Cooking Technique	2.25 $\pm$ 0.68	3.50 $\pm$ 0.75	6.25	< 0.001

Source: Computed from data

Analysis of Results for Cooking Skills Improvement

Both groups showed significant improvements in their cooking skills, as indicated by the t-values and p-values in Tables 1 and 2. However, the experimental group demonstrated larger improvements, particularly in ingredient preparation, recipe following, and overall cooking technique (p-value < 0.001). The video-based learning group showed a greater gain in cooking skills compared to the control group.

5.2 Long-Term Retention of Cooking Skills

The long-term retention of skills was evaluated using a retention test conducted one month after the intervention. A paired t-test was conducted to compare the post-test and retention test scores for both groups.

Table 3: Retention of Cooking Skills (Experimental Group)

Skill Assessment Task	Post-Test Mean Score ($\pm$ SD)	Retention Test Mean Score ($\pm$ SD)	t- value	p- value
Ingredient Preparation	4.05 $\pm$ 0.60	3.90 $\pm$ 0.65	2.15	0.042
Recipe Following	3.90 $\pm$ 0.50	3.85 $\pm$ 0.55	1.12	0.272
Kitchen Safety	4.10 $\pm$ 0.63	4.00 $\pm$ 0.60	2.08	0.049
Overall Cooking Technique	4.00 $\pm$ 0.55	3.90 $\pm$ 0.60	2.22	0.037

Source: Computed from data

The results indicate that students with intellectual disabilities demonstrated significant improvements in their cooking skills after the video-based learning intervention. However, over time, there was a slight decline in some areas, particularly in ingredient preparation, kitchen safety, and overall cooking technique, as indicated by the retention test scores. While these declines were statistically significant, the loss of skills was relatively small. The ability to follow recipes showed no significant decline, suggesting strong retention in that area. Overall, while video-based learning improves cooking skills, periodic reinforcement may be necessary to sustain long-term retention.

Table 4: Retention of Cooking Skills (Control Group)

Skill Assessment Task	Post-Test Mean Score ($\pm$ SD)	Retention Test Mean Score ($\pm$ SD)	t- value	p- value
Ingredient Preparation	3.60 $\pm$ 0.88	3.40 $\pm$ 0.95	2.45	0.024
Recipe Following	3.35 $\pm$ 0.92	3.10 $\pm$ 0.80	3.12	0.005
Kitchen Safety	3.80 $\pm$ 0.70	3.60 $\pm$ 0.75	2.68	0.014
Overall Cooking Technique	3.50 $\pm$ 0.75	3.35 $\pm$ 0.80	2.90	0.009

Source: Computed from Primary data

Analysis of Retention Results

Both groups demonstrated a decline in cooking skills over the one-month retention period, but the experimental group maintained better overall skill levels compared to the control group. The experimental group showed smaller declines in ingredient preparation and kitchen safety, with p-values less than 0.05, indicating significant retention. In contrast, the control group showed more

substantial drops in skill retention, particularly in recipe following and overall cooking technique.

6. Results

6.1 Improvement in Basic Cooking Skills

The experimental group displayed a marked improvement in basic cooking skills compared to the control group, with significant gains noted in skill accuracy and completion time.

6.2 Long-Term Retention and Recall

Students in the video-based learning group retained cooking skills more effectively, with recall scores at both two- and four-week intervals outperforming those of the control group.

6.3 Engagement and Motivation

Observational and survey data indicated that students in the video-based learning group were more engaged and motivated than their peers in traditional learning settings. Qualitative feedback suggested that the ability to control video playback increased students' confidence in completing cooking tasks independently.

7. Discussion

7.1 Advantages of Video-Based Instruction for Intellectual Disabilities

The findings confirm that video-based instruction is highly beneficial for teaching practical skills to students with intellectual disabilities, supporting previous research on the advantages of digital learning tools in special education. Enhanced engagement and motivation, along with improved retention, suggest that video-based tools provide a more accessible and enjoyable learning experience for students.

7.2 Implications for Culinary Education

This study demonstrates that video-based learning not only aids in skill acquisition but also enhances the students' ability to retain and apply learned skills over time. As culinary skills are essential for independent living, the implementation of video-based instructional tools can greatly contribute to the effectiveness of life skills training programs.

Conclusion

The study demonstrates that video-based learning is highly effective in improving basic cooking skills for students with intellectual disabilities. The experimental group showed significant improvements in cooking skills, with better retention over time compared to the control group. While both groups experienced some decline in skills during the retention period, the video-based learning group exhibited smaller decreases, particularly in areas like ingredient preparation and kitchen safety. The findings suggest that video-based instruction can enhance both skill acquisition and engagement, but periodic reinforcement may be necessary for long-term retention.

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