

Gamification and Serious Games in Vocational Training



Let's-a work! Gamifying employment and other activities for people with neurodevelopmental disabilities

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Disclaimers

This presentation serves as a call to attention for gamified interventions and provides an exploratory look at the use of gamification within and outside of vocational rehabilitation. It does not claim full knowledge of the use of gamification within rehabilitation.

Welcome Adventurers!

The magical wizard, AntiBore, has enchanted this webinar, and scattered my gear. help me research gamification and serious games as they relate to employment, and we'll get my stuff back in no time... Thanks, and Good Luck!

- Martino

Antibore: Be prepared to play!

Missions - Topics Covered

Coin of Difference:

Discuss and Define
Gamification,
Serious Games
and Their Utility

Sword of Motivation:

Explore why
gamification works
- intrinsic and
extrinsic
motivation

Shield of Evidence:

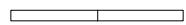
Examine research
surrounding
gamified
interventions in and
out of jobs

Key of

Understanding:

Observe unstudied
applications and
address areas for
future research in
gamification

Choose the right Pattern to continue...



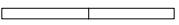
1) Key, Sword, Shield, Coin

3) Coin, Sword, Shield, Key

2) Shield, Coin, Sword, Key

4) Coin, Sword, Key, Shield

Gamification vs. Serious Games



Gamification: Infusing game design elements in non-game contexts. (Gamify, 2020)

Serious Games: A game built with "serious" goal of education. (Fitz-Walter, 2020)

- One is Part of the Other
 - Often within the realm of gamification, serious games are used because video games have become mainstream, while smartphone have made games accessible anywhere. (Gamify, 2020)

Do they actually work?

A Quote about Gamification:

"Gamification is gaining increasing presence and importance in our daily lives, applications, services, and business" (Baptista & Oliveira, 2019).

Multidisciplinary Applications:

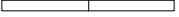
According to Baptista & Oliveira (2019), gamification and serious games have been used in at least 19 different discipline fields; however, only the most relevant fields to the population of rehabilitation counseling are health and education

Education:

Kim et al. (2018): 20 different game type experiences, 8 gamer types

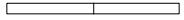
Health:

Fleming et al. (2017): Multiple studies from various systematic reviews showed gamification and games to be feasible, but needs more research



**Coin of Difference:
Got it!**

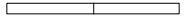
Motivation: Why Games Work



Octalysis: Eight Core Drives of Motivation in Gaming

1. Epic Meaning and Calling
2. Development and Accomplishment
3. Empowerment of Creativity/Feedback
4. Ownership and Possession
5. Social Influence and Relatedness
6. Scarcity and Impatience
7. Unpredictability and Curiosity
8. Loss and Avoidance

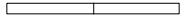
Motivation: Why Games Work



According to a TEDx Talk from 2014, motivation for gaming is in the, "Octalysis," or Eight Core Drives of Motivation:

1. Epic Meaning and Calling
2. Development and Accomplishment
3. Empowerment of Creativity/Feedback
4. Ownership and Possession
5. Social Influence and Relatedness
6. Scarcity and Impatience
7. Unpredictability and Curiosity
8. Loss and Avoidance

Motivation: Why Games Work (Cont.)



Extrinsic Tendency

1. Development and Accomplishment
2. Ownership and Possession
3. Scarcity and Impatience

Intrinsic Tendency

1. Empowerment of Creativity/Feedback
2. Social Influence and Relatedness
3. Unpredictability and Curiosity

White Hat Gamification

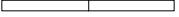
1. Development and Accomplishment
2. Epic Meaning and Calling
3. Empowerment of Creativity/Feedback

Black Hat Gamification

1. Scarcity and Impatience
2. Loss and Avoidance
3. Unpredictability and Curiosity

(TEDxTalk, 2014)

Potion Predicament



Martino has been poisoned! He needs a healing potion to be saved and get his sword back. Figure out which ingredients he needs by matching the scenario to the core motivation displayed by a person with Neurodevelopmental Disability (ND).

Scenario 1

Scenario 2

Scenario 3

Potion Predicament

James with ASD expressed to his counselor that he feels excited about attending a work party later in the week; he put in extra hours over the week because, according to his work leaderboard, he was in last place for productivity. After leaving work yesterday he saw he was in third place.

Social Influence/
Relatedness

Unpredictability
and Curiosity

Loss and
Avoidance

Potion Predicament

Lily with IDD had dark circles under her eyes and was nodding off during the meeting with her counselor, but she did not say anything was wrong. After getting permission from Lily, the counselor called her employer and found out that she put in many more hours the last week; he mentioned that he threatened to cut her hours after "taking too long with an administrative task."

Epic Meaning and
Calling

Ownership and
Possession

Loss and
Avoidance

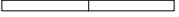
Potion Predicament

Francis with down syndrome enters his counseling meeting with a grin on his face. His counselor comments on it, and Francis tells him that he just got a call back from an Informational Technology employer that offered him an internship. Francis says, "I know it's just paperwork and copies, but I still get to help people in a field that I want to do."

Epic Meaning and
Calling

Scarcity and
Impatience

Empowerment of
Creativity/Feedback



Sword of Motivation: Got it!

Mushroom Menaces

After recovering from poison and obtaining the sword of motivation, Martino now ventures to the temple of research, where he hopes to once again find his shield of evidence... but alas! Strange talking mushrooms have grown over the Source Step entrance - they must be cut down by examining the research!

Martino: Yuck! Who would ever eat these mushrooms?

Mushroom: Italian Plumbers...

At the Entrance of the Temple of Research

The first mushroom says, "Show us you are worthy to get the shield! We each represent a gamified study for a population with ND. To get through, you'll have to examine how gamification has been used to help the physical health of people with ND, and decide which study could best help the overall physical health of Individuals with ND in the workforce. Cut down the mushroom that represents that study, and we'll both disappear!"

You examine the source step beneath the mushrooms to find two studies:

McGarty et al. (2021): The Go2Play Active Play Intervention Feasibility Study

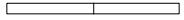
- Goal: Children get a minimum of 60 mins of moderate to vigorous physical activity (MVPA) outdoors using 30 mins of structured games (addressing movement skills) and 30 mins of free play (addressing social interaction)
- Participants: 21 children aged 7-12 years old verified to have IDD using the CAIDS-Q across two schools - mostly male, and ranged from underweight to obese
- Results:
 - 100% recruitment and retention rates (existing relationships to schools)
 - 90% attendance to sessions (mean session time was 40.60 minutes)
 - Three out of four tests used determined the intervention as "feasible" with the last test - the playground observation of Peer Engagement (POPE) - being an unsuitable tool

Study

Kim et al (2020): *Puzzletwalk* App Iterative Design Inquiry

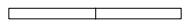
- Goal: Develop an app called *Puzzletwalk* that allows adults with ASD to become more physically active through gamifying Behavior Change Techniques (BCTs)
- Study Overview:
 - Previous Research - the authors delve through BCTs, gamification, and mobile technology as it informed their work
 - Development Procedure - authors discuss direct research with the ASD community through surveys and interviews, provided multiple prototype apps that utilized feedback, and analyzed usability through evaluation
- Future Implications - authors discussed topics about the app design based off the feedback provided in the development procedure along with limitations
- Results: The app was determined to be "readily applicable" and an "adjunct intervention option for increasing PA" for adults with ASD; larger studies were implicated as the next step

At the Entrance of the Temple of Research



The second mushroom asks: "Which of our gamified studies could best help the overall health of people with ND in the workforce?"

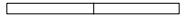
- Mushroom 1: Go2Play
- Mushroom 2: Puzzlewalk



AYYEE!

**You cut down the second mushroom
and both of them disappear.**

Inside the Temple of Research



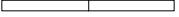
Entering the Temple of Research, you find a note on the floor:

Martino,

Well done on making it this far! I hope you enjoyed my enchanted mushrooms - they provided the practice you will need to get your shield back. Hope you choose the right tunnel...

- Antibore

Tunnel Trouble

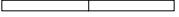


Above each doorway, studies are put on display - both are gamified interventions, but there's a distinction in how they could help with vocational training...

Study One

Study Two

Tunnel One



Willis et al. (2021): Game-based Assessments for Individuals with ASD Seeking Jobs

- Goal: to examine the use of three games (Disconumbers, Shapedance, and Digitspan) by testing a null hypothesis - that there would be no difference in scores between groups of neurotypical and neurodiverse individuals to use in assessing individuals with ASD for job positions
- Participants: 586 culturally diverse college-aged participants; 263 of which with ASD

Tunnel One- Method

Willis et al. (2021): Game-based Assessments for Individuals with ASD Seeking Jobs

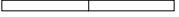
- Method
 - Split participants into four groups between two packages as a hiring assessment
 - Package 1: Disconumbers and Shapedance: memory/math-based game and visuospatial ability game
 - Package 2: Digitspan and Shapedance: memorization and visuospatial ability game
 - Measurement: 0-5 true interval scale

Tunnel One- Results

Willis et al. (2021): Game-based Assessments for Individuals with ASD Seeking Jobs

- Results
 - The hypothesis was only partially supported
 - Package 1 had significantly different scores, but Package 2 did not
 - Many limitations were explored, but of particular note:
 - Difficult to prove a null hypothesis
 - One-way interviews (part of the process that came before the game)
"may have drained cognitive resources" from the ASD users

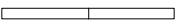
Tunnel Two



Tan et al. (2022): Gamified Augmented Reality Vocational Training for Adults with Intellectual and Developmental Disabilities

- Goal: test a 10-week gamified augmented reality (AR) platform to train individuals with intellectual and developmental disabilities (I/DD) - testing feasibility and accessibility through both participants and trainers while measuring changes in vocational/cognitive skills of participants
- Participants: 15 people with I/DD; exclusions include those who could not speak English or who had co-occurring epilepsy

Tunnel Two- Method



Tan et al. (2022): Gamified Augmented Reality Vocational Training for Adults with Intellectual and Developmental Disabilities

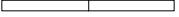
- Method
 - Implement four training scenarios focused on 1) work etiquette, 2) sandwich making, 3) serving drinks, and 4) cashiering using Augmented Reality Games to Enhance Vocational Ability of Patients (REAP)
 - Using Cognistat Test (a neurobehavioral exam) to determine a baseline, participants could then move through scenarios as "Beginner" "Intermediate" or "Advanced"
 - Semi-Structured user feedback interviews given to both participants and trainers

Tunnel Two- Results

Tan et al. (2022): Gamified Augmented Reality Vocational Training for Adults with Intellectual and Developmental Disabilities

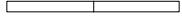
- Results:
 - Overall, the intervention was received with positivity
 - Vocational skills along with soft skills, self-regulation skills, and cognitive functions were shown to have been learned
 - Of particular note, since it was a trainer-participant experience, there was commentary about desiring a "second player" for the trainer

Tunnel Trouble



Which tunnel represents gamification of Vocational screening?

- Tunnel One
- Tunnel Two



Shield of Evidence: Got it!

Antibore's Apprentices

After exiting the Temple of Research, Antibore appears with three of his apprentices! "Bravo, Martino! You have learned gamification, serious games, and their application well. To get back your precious key of understanding, listen to my three apprentices who bring news of real, yet unstudied interventions!"

Finanture

Laundromus

Avatarian

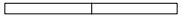
Finanture

(Joanne McLain, Personal
Communication, 12/22/23,
2/3/23, 2/16/23)

Finature- Mini-games: People with I/DD learned about the importance of money management and financial health through mini-games; this was not a full game. Rather, this was part of a larger curriculum given by the Financial Health Institute.

- The Game: Kikki's Clothing shopping Game
 - Giving a set amount to the player for creating an outfit
 - Every time money was spent, the wallet would decrease by that amount
 - By the end of the minigame, you could have three items or only two depending on how much money was spent
 - Players also had the option of not choosing to spend any money
 - Feedback is supportive of choices
 1. Exception: when trying to spend more money than they have - "Oh no! Try again" response
 - Shows practicality in spending money

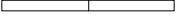
Finanture



(Joanne McLain, Personal
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2/3/23, 2/16/23)

- Notes on the game:
 - Gave positive reinforcement
 - Puts a real-life situation in a game approach - no real consequences, but still shows what they could be after a given action
 - Since it was done live in teams, it allowed for teamwork and competition
- A Few Perspectives: Joanne from Financial Health Institute
 - Games work well when there is a story behind them
 - Brains are wired for story-telling, and lessons are better remembered by stories

Lauderus

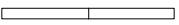


(Darby Remley, Personal Communication, 11/9/22, 1/24/23, 2/3/23,)

Lauderus - Low-Tech Gamification: Darby Remley made gamified the commercial laundry center to increase productivity and change behaviors.

- The Game: No name - just gamifying the job for people with developmental disabilities for 12 weeks
 - Tokens: coins that employees could earn and put in their personalized bags to exchange for prizes at the end of each week
 - Tokens were earned depending on progress
 - Baselines for folding laundry used to monitor how progress is measured
 - 10 tokens - exchange for \$1 prize (Candy bars)
 - 20 tokens - exchange \$5 prize (Gift Cards)

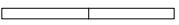
Lauderus



(Darby Remley, Personal Communication, 11/9/22, 1/24/23, 2/3/23,)

- "Go for the Gold" Leaderboard:
 - Leaderboard created to help individuals "graduate" from the intervention by awarding stars at the end of each week: Gold, Silver, Bronze
 - Sustained Gold stars = graduation from the program
- Individual Boards: monitored behaviors: focus on-task, attendance, being appropriate/kind/positive, producing good work
- Gamification Specialist Supervision: monitors progress while coaching and rewarding employees

Launderus

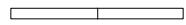


(Darby Remley, Personal Communication, 11/9/22, 1/24/23, 2/3/23,)

- Break-time Activities
 - Building in activities during breaks for people with DD to enjoy
- Perspectives from Darby Remley
 - Successful for the year it was completed - integrated across the entire laundry
 - Increased both productivity and motivation
 - Even after graduating from the program, individuals wanted to know what the break activity was
 - Promotion from other employees and positive connection
 - People with I/DD benefit from a positive environment

Avatarian

(Dr. Thomas Conway, Personal Communication, 2/3/23, 2/7/23,)



Avatarian - EmployAble Project: an online game intervention that focused on helping people with disabilities through the employment process - it was funded by the Kessler Foundation.

- The Game: Second Life
 - Second Life is an online virtual game where players can create their own avatar to explore the virtual world. Virtual Ability Inc. created islands for the purpose of vocational training of individuals with disabilities. Over two years, there were 50 participants ranging in disability (blind, deaf, traumatic brain injury, and ASD) and location (some places included: Florida, New York, New Jersey, Colorado)
 - Virtual Ability Inc. created two main islands:
 - Virtual Orientation Island: where players learn how to play the game
 - Virtual Ability Island: where players start the employment process

Avatarian

(Dr. Thomas Conway, Personal Communication, 2/3/23, 2/7/23.)

- Process

- Orientation Island

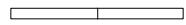
1. Learn controls, and get whatever items best represent themselves - including wheelchairs

- Virtual Ability Island

1. Welcome Center: learn about the EmployAble Project and funders
2. Skills Builder Building: start with hearing lectures on the employment process
3. Match Maker Building: employees w/disabilities, employers, and mentors check connect
4. Access Info Building: practice job interviews, create resumes and get necessary supports
5. Plaza: practice skills where you want to work in various industries: hospitality (inn/spa), construction, health care, printing/publishing, city hall, post office, credit union IT services, security, clothing retail, and restaurant (café)

Avatarian

(Dr. Thomas Conway, Personal Communication, 2/3/23, 2/7/23,)



- Perspectives from Dr. Thomas Conway:
 - People with ASD found it easier; would go through job interviews sometimes 3-4 times for feedback
 - Working with mentors in groups was the most effective aspect of the intervention

Antibore's Apprentices

Here is Antibore's question: "After listening to my apprentices, can you match the intervention type to the correct apprentice who spoke of it?"

Finature

Low-tech gamification
of a specific job

Online game used to gamify
the employment process

Serious game to help
understand finance

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Antibore's Apprentices

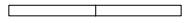
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Avatarian

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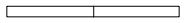
Serious game to help
understand finance



YARGH!

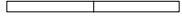
**The three apprentices disappear and
antibore stands alone in front of you.**

One Final Question



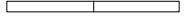
"Impressive job, Adventurers! I would be glad to give Martino back his key of understanding - just answer me this last question... what are the next steps for research when looking at the gamification of vocational training and employment for individuals with ND?

- Cross-analysis of the Octalysis of motivation with peer-reviewed, evidence-based practices in gamified interventions
- More widespread application of previously used gamification techniques followed by peer-reviewed research
- Advocating for employers to use gamified techniques in their employment process for people with ND
- Applying the research of gamification and serious games more directly to transition-age youth with ND through implementation and peer-reviewed study
- All of the above



**Key of Understanding:
Got it!**

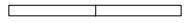
Before We Get to Questions



You and Martino have worked hard on this adventure, but we want to know how to make it better!

Please take the following evaluation, and then we can take your questions.

Mushroom 1: Just when you think the adventure is over...



Thanks for Playing!

**Mushroom Two: Don't you just love
happy endings?**