

White Paper: 3DPen's Transformative Impact in Education

PELICAN FLY, LLC



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Empowering Futures: Transforming STEM, Life Skills, and Creativity with 3D Pen Technology

Executive Summary

The Hampden Pilot and the 3DPenParty Design Challenge are groundbreaking programs that leverage 3D pen technology to transform STEM education for underserved communities and students with special needs. Led by Pelican Fly, LLC, these initiatives integrate creativity, problem-solving, and life skills to foster academic success and emotional growth.

The key highlight from the two studies is the transformative impact of 3D pen technology on STEM education, particularly for students with special needs and underserved communities. This technology not only enhances engagement and skill development but also addresses systemic barriers by providing inclusive, hands-on learning experiences that foster creativity, problem-solving, and emotional growth.

Key Highlight:

- **Inclusive Learning:** 3D pens offer a tactile, interactive way of learning that bridges abstract STEM concepts with real-world applications, making them particularly beneficial for students who struggle with traditional teaching methods.
- **Therapeutic Benefits:** These tools have been shown to reduce anxiety and improve focus, especially for students with autism, providing therapeutic value alongside educational benefits.
- **Future Opportunities:** By equipping students with skills in 3D design and manufacturing, these programs prepare them for higher-paying jobs in technology-driven industries, contributing to economic mobility and workforce development.

In this White Paper you can review:

Addressing Challenges in STEM Education

The Problem Statement and the Solution

Case Studies: Hampden Pilot & the Design Challenge

Economic and Social Implications

Linking Sp Ed to Juvenile Confinement

Scaling for Success



Addressing Challenges in STEM Education

STEM education is vital for preparing students for technology-driven careers but remains inaccessible to many underserved communities and students with special needs.

Pelican Fly, LLC—a Baltimore-based Minority Business Enterprise (MBE)—has pioneered the use of 3D pens to address these challenges. With over 55,000 hours of instruction provided to more than 6,000 students, Pelican Fly has shown how hands-on learning can unlock creativity, boost confidence, and improve outcomes.

Problem Statement

Students with disabilities face unique challenges in STEM education:

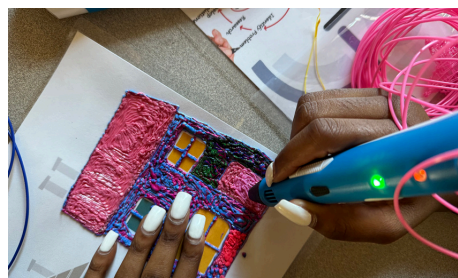
- Limited engagement due to abstract teaching methods.
- Barriers to developing fine motor skills and spatial reasoning.
- Emotional struggles such as anxiety and low self-confidence.



Negative Impacts

These issues disproportionately affect underserved communities, exacerbating educational inequities. Moreover, research highlights a troubling link between special education needs and juvenile confinement:

- Youth with special education needs are seven times more likely to face suspension or expulsion compared to their peers without disabilities[1].
- Such disciplinary actions significantly increase the likelihood of juvenile justice involvement[1][3].

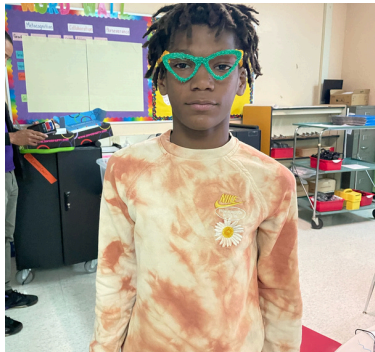


The Solution

3D pens offer an innovative solution by providing tactile, interactive learning experiences that bridge abstract concepts with real-world applications. Key benefits include:

- Improved understanding of STEM concepts like geometry and robotics.
- Enhanced fine motor skills through hands-on activities.
- Therapeutic effects, ie reduced anxiety and increased focus.
- Using life skills—such as time management and teamwork—students gain competencies that extend beyond the classroom.

Case Studies



The Hampden Pilot Study

Overview: Conducted with Baltimore City Public Schools (BCPS), this pilot program introduced 3D pens to a classroom of 21 students with IEPs and 504 designations at Hampden Elementary/Middle School.



The 3DPenParty Design Challenge

Building on the Hampden Pilot's success, the Design Challenge expanded to nearly 100 students across four Baltimore City schools - two elementary and two elementary/middle schools, over a 14 week period.



Economic / Social Implications



Key Findings: Hampden

- Increased awareness of STEM career pathways.
- Enhanced confidence in creative abilities.
- Significant improvements in fine motor skills and spatial reasoning.
- Therapeutic benefits for students with autism.



Key Findings: Design Challenge

Students worked on projects such as:

- Functional spaces (e.g., architectural designs).
- Creative transportation solutions addressing community needs.
- Cultural storytelling through design.
- Wearable art in fashion categories.

- Equipping students with skills in 3D design prepares them for higher-paying jobs in technology-driven industries such as manufacturing and digital arts. This initiative addresses systemic barriers faced by individuals with disabilities:
 - Increased earning potential reduces reliance on social services.
 - Workforce development contributes to local economies by creating skilled labor pools.
 - **Statistics:** Only 3.2% of employed persons with disabilities work in computer or mathematical occupations[7]. Programs like these can help close this gap.
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Future Initiatives: NextGrind Academy



Special Education & Juvenile Confinement

Special Education and Juvenile Confinement: Research underscores a strong link between special education needs and juvenile justice involvement:

- Nearly 40% of justice-involved youth qualify for special education services[1],[5].
- School exclusion significantly increases recidivism rates among youth with disabilities[1],[5].
- Black children classified as disabled are disproportionately affected by this "special ed-to-prison pipeline," being up to five times more likely than white peers to face confinement[3].
- **Social Benefits:** Beyond economic outcomes, these programs foster inclusivity by empowering students with disabilities to thrive in academic settings:
- Reduced anxiety improves emotional well-being.
- Collaborative projects build social skills and teamwork abilities.
- Increased confidence enables students to pursue ambitious goals.



Linking 3D Pen Technology to Justice-Involved Youth

The NextGrind program aims to disrupt this cycle by providing justice-involved youth with:

- Career-ready skills in 3D design, robotics, and programming.
- Emotional support through therapeutic hands-on activities.
- Life skills training for successful reintegration into society.

Delivery Model: NextGrind combines online instruction with hands-on activities facilitated by correctional staff trained as Teaching Assistants (TAs). This scalable model ensures cost-effective delivery across multiple facilities without logistical challenges.



Future Initiatives: The NextGrind Academy

- Key Takeaways
- Enhanced engagement through tactile learning tools.
- Improved fine motor skills and spatial reasoning.
- Therapeutic benefits for students with autism.
- Economic potential through workforce development.
- Reduction in recidivism rates among justice-involved youth through targeted interventions.

Call to Action: Transform Lives Through NextGrind:

Contact us to implement our hybrid learning academy in juvenile facilities and empower justice-involved youth with career-ready STEM skills.



Recommendations for Scaling Success and a Vision for Inclusive Education

To maximize impact:

- Expand access to underserved schools nationwide.
- Partner with educational institutions, therapists, juvenile facilities, and parents for funding support.
- Advocate for policy changes prioritizing adaptive tools for special education.
- Conduct longitudinal studies to evaluate long-term outcomes.

The Hampden Pilot, Design Challenge, and NextGrind program demonstrate the transformative potential of 3D pens in reshaping STEM education for diverse learners—including those involved in the juvenile justice system. By fostering creativity, technical skills, emotional growth, and reducing recidivism risks, these programs pave the way for a more inclusive future where all students have the opportunity to thrive.

Thank you for reading!

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