Randolph Township Schools
Randolph Middle School

# 3D Storytelling
# Curriculum

*"I found I could say things with color and shapes*
*that I couldn't say any other way — things I had no words for."*

~Georgia O'Keeffe

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**Curriculum Developed**
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**Date of Board Approval**

# Randolph Township Schools
# Department of Humanities
# 3D Storytelling

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Randolph Township Schools

# Mission Statement

*We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.*

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**Randolph Township Schools**
**Affirmative Action Statement**

**Equality and Equity in Curriculum**

The Randolph township School district ensures that the district's curriculum and instruction are aligned to the state's standards. The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

# RANDOLPH TOWNSHIP BOARD OF EDUCATION
## EDUCATIONAL GOALS
## VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:
- The needs of the child come first.
- Mutual respect and trust are the cornerstones of a learning community.
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members.
- A successful learning community communicates honestly and openly in a non-threatening environment.
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways.
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences.
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth.

# Randolph Township Schools
## Department of Humanities
## 3D Storytelling

# Introduction

3D Storytelling is an engaging way for students enhance their literacy and creativity skills while utilizing the engineering and design process. This interdisciplinary, middle school cycle course will facilitate opportunities for students to develop their 21st Century skills such as thinking creatively, critically and collaboratively in a workshop/makerspace environment. Students will organize and self-direct their own learning as they devise a plan, prioritize tasks and execute that plan in which they compose and create original stories and/or convey ideas through words and artistic representation in the form of a dimensional "pop-up" style book. They will apply mathematical, engineering, visual art and literacy skills as they conceive and develop their own stories or messages. Additionally, students will improve their visual literacy skills through the evaluation of mentor artwork in order to create and engineer their own pop-up designs. To achieve these goals, the course will be guided by the Language Arts Common Core Standards, the Next Generation Science Standards, the New Jersey Technology Standards and the New Jersey Art Standards.

# RANDOLPH TOWNSHIP SCHOOL DISTRICT
## Curriculum Pacing Chart
## 3D Storytelling

| SUGGESTED TIME ALLOTMENT | UNIT NUMBER | CONTENT - UNIT OF STUDY |
|---|---|---|
| 2 weeks | I | **Introduction to 3D Structures** |
| 3 weeks | II | **Storytelling** |
| 4 weeks | III | **Workshop** |

| | | |
|---|---|---|
| **COURSE TRANSFER GOAL**: Compose, design and create an original 3D story. | | |

| **Goals** | **ENDURING UNDERSTANDINGS** | **ESSENTIAL QUESTIONS** |
|---|---|---|
| CCSS ELA<br>SL.7.1. b: Follow rules for collegial discussions, track progress toward specific goals and deadlines, and define individual roles as needed. | A system is a set of connected parts that form a complex whole. | • How can we make a paper system? |
| SL.7.1.c: Pose questions that elicit elaboration and respond to others' questions and comments with relevant observations and ideas that bring the discussion back on topic as needed. | A pop-up book is a system of parts that work together to create movement or provide for user interaction. | • How can we figure out how a system works?<br>• How can we use a model to learn? |
| SL.7.1. d: Acknowledge new information expressed by others and, when warranted, modify their own views.<br><br>NGSS Engineering<br>MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.<br><br>NGSS Science<br>MS-PS2-2: Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object. | **KNOWLEDGE** | **SKILLS** |
| | **Students will know:**<br>A pop-up book is a paper system made of multiple pieces of paper working together to create an interactive, moving visual.<br><br>Systems can be understood by looking at their individual parts.<br><br>Reverse engineering is the deconstruction of a system in order to understand its parts.<br><br>**VOCABULARY:**<br>v-folds, lifts/flaps, pull-strips, hubs/discs, interactive, 90-degree elements, 180-degree elements, gatefold, obtuse angle, acute angle, slit, valley fold, mountain fold, spine, linkage, washer tab<br><br>**KEY TERMS:**<br>pop-ups, reverse engineering, systems, model, applied elements, base elements, single sheet element | **Students will be able to:**<br>Engineer foundational pop-up mechanisms including v-folds, lifts/flaps, pull-strips, hubs/discs.<br><br>Deconstruct model pop-ups into separate parts in order to evaluate the interacting components of the system.<br><br>Analyze and explain reactions to the text and illustrations in a variety of pop-up books. |

**ASSESSMENT EVIDENCE:**
- Makerspace procedures and safety quiz
- Journal responses
- Student-created model/prototype of the basic folds (v-folds, lifts/flaps, pull-strips, hubs/discs)
- Vocabulary check

**KEY LEARNING EVENTS AND INSTRUCTION:**
- Establish routines of a makerspace
- Lesson on equipment safety
- Reverse engineering mini-lesson ("What Makes You Say That" from *Harvard Project Zero*)
- Reverse engineering in collaborative groups
- Student-created model/prototype jigsaw

| SUGGESTED TIME ALLOTMENT | CONTENT-UNIT OF STUDY | SUPPLEMENTAL UNIT RESOURCES |
|---|---|---|
| 2 Weeks | Unit I: Introduction to 3D Structures | Smithsonian History of Pop-ups<br>http://www.sil.si.edu/pdf/FPPT_brochure.pdf<br><br>Templates from Elements of Pop Up Hardcover – October 1, 1999 by James Diaz<br>http://www.kyleolmon.com/files/ElementsTemplates.pdf<br><br>Pop up Places<br>https://www.makepopupcards.com/downloads/diy-blank-pop-up-paper-house/<br><br>Templates, more complex<br>http://wp.robertsabuda.com/make-your-own-pop-ups/<br><br>Glossary of Terms on Page 26<br>http://moosenoodle.com/labs/hendrix/dr_diss/myproposal.pdf<br><br>Artful Thinking<br>https://issuu.com/captcurk/docs/artful_thinking-using_art_to_promote_thinking/1b |

**COURSE TRANSFER GOAL**: Compose, design and create an original 3D story.

| GOALS: | ENDURING UNDERSTANDINGS | ESSENTIAL QUESTIONS |
|---|---|---|
| CCSS ELA<br>W.7.3: Write narratives to develop real or imagined experiences or events using effective technique, relevant descriptive details, and well- structured event sequences. | When effectively used together, language and visuals can be complementary components of a powerful story. | • How might language and visuals work together to convey a story? |
| W.7.3.a: Engage and orient the reader by establishing a context and point of view and introducing a narrator and/or characters; organize an event sequence that unfolds naturally and logically. | Audience, purpose, and desired outcome affect the structure of a story. | • Why might a writer consider audience and purpose to determine the form and structure of a story? |

| | KNOWLEDGE | SKILLS |
|---|---|---|
| W.7.3.c: Use a variety of transition words, phrases, and clauses to convey sequence and signal shifts from one time frame or setting to another.<br><br>W.7.3.d: Use precise words and phrases, relevant descriptive details, and sensory language to capture the action and convey experiences and events.<br><br>W.7.4: Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. (Grade-specific expectations for writing types are defined in standards 1-3 above.)<br><br>W.7.5: With some guidance and support from peers and adults, develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed. (Editing for conventions should demonstrate command of Language standards 1-3 up to and including grade 7 here.)<br><br>L.7.2 Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.<br><br>L.7.2.b Spell correctly. | **Students will know:**<br>Stories communicate real or imagined experiences or events.<br><br>Written stories are enhanced by using techniques such as figurative language, sensory details, and pacing of plot.<br><br>Word choice and transitions are necessary components for conveying a story.<br><br>Narrative writing includes literary elements such as a problem, solution, plot, setting, characters, a narrator, and a theme.<br><br>Poetry writing includes a speaker, imagery, a turning point, a resolution and a theme.<br><br>Precise word choice effectively conveys tone and mood.<br><br>The writing process is not complete without significant revision and editing of a draft. | **Students will be able to:**<br>Craft a story that communicates real or imagined experiences.<br><br>Utilize appropriate writing techniques and literary elements to enhance a story.<br><br>Select appropriate vocabulary to produce a clear, coherent story and/or convey tone and mood.<br><br>Utilize literary elements for appropriate effect in a story.<br><br>Analyze a story draft, independently revise content, grammar, usage, and conventional errors.<br><br>Design and construct a storyboard, including words and images, as a guide for a pop-up book. |

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| | | |
|---|---|---|
| L.7.3 Use knowledge of language and its conventions when writing, speaking, reading or listening.<br><br>L.7.3.a Choose language that expresses ideas precisely and concisely, recognizing and eliminating wordiness and redundancy.<br><br>Art Standard<br>1.1.12.D.2: Stimuli for the creation of artworks can come from many places, including other arts disciplines. Translate literary compositions by using them as stimulus/inspiration for corresponding visual artworks.<br><br>1.4.8.A.1: Contextual clues to artistic intent are embedded in artworks. Analysis of archetypal or consummate works of art requires knowledge and understanding of culturally specific art within historical contexts<br><br>1.4.8.A.5: Symbolism and metaphor are characteristics of art and art-making<br><br>1.4.12.B.2: The cohesiveness of a work of art and its ability to communicate a theme or narrative can be directly affected by the artist's technical proficiency as well as by the manner and physical context in which it is performed or shown | The elements and principles of design can be combined to create a vehicle for expression.<br><br>Visuals impact a reader's interpretation of a story by providing more concrete details.<br><br>Color wheels help artists select appropriate color schemes that communicate a mood or message.<br><br>In art, a symbol is a visual picture of a recognizable item that represents a more complex idea.<br><br>Tools are thoughtfully selected for the combination of two-dimensional art forms with three-dimensional art forms.<br><br>**VOCABULARY:** tone, mood, transitions, narrative, poetry, problem, solution, plot, setting, characters, narrator, theme, speaker, imagery, turning point, resolution, figurative language, sensory details, pacing, dialogue, connotation, denotation, color scheme<br><br>**KEY TERMS:** literary elements, word choice**,** storytelling, artful thinking**,** elements of design | Compare and contrast the use of elements of art and principles of design in works of art.<br><br>Apply specific elements of art and production techniques for expressive purposes.<br><br>Apply appropriate images that will enhance the reader's reading experience.<br><br>Select and apply color schemes to create a mood.<br><br>Explain the concept of symbolism in art.<br><br>Apply understanding of symbolism through the creation of distinctive symbols for artistic expression.<br><br>Demonstrate knowledge and application of tools and techniques to combine multiple art media into a two or three-dimensional work of art.<br><br>Demonstrate critical thinking skills in tool selection when combining art media to find functional solutions to potential issues.<br><br>Design and assemble mixed media pieces using techniques such as, but no limited to, collage, photo transfers and paint layering. |

**ASSESSMENT EVIDENCE:**
- Journal responses
- Original storyboard including written and visual expression
- Teacher conference anecdotal notes


**KEY LEARNING EVENTS AND INSTRUCTION:**
- "See, Think, Wonder" mini-lesson (*Harvard Project Zero*)
- "Color, Symbol, Image" mini-lesson (*Harvard Project Zero*)
- Close-reading mentor texts for craft and structure
- Mini-lessons: Effective writing strategies including *Lucy Calkins Units of Study*
- Mini-lesson: Color choice
- Mini-lesson: Word choice
- Mini-lesson: Storyboarding
- Peer writing conferences

| SUGGESTED TIME ALLOTMENT | CONTENT-UNIT OF STUDY | SUPPLEMENTAL UNIT RESOURCES |
|---|---|---|
| **3 Weeks** | **Unit II: Storytelling** | Elements of Design and Art (for storyboarding) http://splitcomplementary.blogspot.com/2012/08/new-and-improved-elements-and.html?m=1 <br><br> Psychology of Color https://s-media-cache-ak0.pinimg.com/564x/3f/a4/12/3fa4126abf2e9b5e93a7efe8052dae5d.jpg <br><br> http://static1.1.sqspcdn.com/static/f/482333/16334716/1328020419777/The-Psychology-of-Color-Infographic.png?token=fN%2BmrbziPGLBp527c6tD8pDe7h8%3D <br><br> Artful Thinking https://issuu.com/captcurk/docs/artful_thinking-using_art_to_promote_thinking/1b |

**COURSE TRANSFER GOAL**: Compose, design and create an original 3D story.

| GOALS: | ENDURING UNDERSTANDINGS | ESSENTIAL QUESTIONS |
|---|---|---|
| NGSS Engineering<br>MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.<br><br>MS- ETS1.A (DCI): Defining and Delimiting Engineering Problems<br>The more precisely a design task's criteria and constraints can be defined, the more likely it is that the designed solution will be successful. Specification of constraints includes consideration of scientific principles and other relevant knowledge that are likely to limit possible solutions. (MS-ETS1-1) | The engineering design process is a series of steps that engineers use to guide them as they solve problems. | • How might you create a product using the design process? |
| MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.<br><br>MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.<br><br>MS-ETS1.B (DCI): Developing Possible Solutions<br>There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. (MS-ETS1-2), (MS-ETS1-3)<br><br>MS-ETS1.B (DCI):  Developing Possible Solutions<br>Sometimes parts of different solutions can be combined to create a solution that is better than any of its predecessors. (MS-ETS1-3)<br><br>MS-ETS1.C (DCI): Optimizing the Design Solution<br>Although one design may not perform the best across all tests, identifying the characteristics of the design that performed the best in each test can provide useful information for the redesign | **KNOWLEDGE**<br><br>**Students will know:**<br>The design process is cyclical in order to make improvements through multiple iterations.<br><br>Describing a project in terms of a problem statement is a first step in applying the engineering design process.<br><br>An open ended design process promotes creativity and practicality.<br><br>Two key themes of the engineering design process are teamwork and design.<br><br>Teamwork is crucial for innovation. The process of "talking it out" provides the stepping stone for new ideas; this is also called brainstorming.<br><br>Designing and modeling ideas is an aspect of the design process where prototypes are created and tested. | **SKILLS**<br><br>**Students will be able to:**<br>Brainstorm a model/prototype for a pop-up book through collaborative discussion and research.<br><br>Revise and refine storyboard to include written story with diagrams of specific paper fold elements.<br><br>Apply the engineering design process.<br><br>Build a model or prototype of pop-up book which includes the written story and paper folds.<br><br>Test and evaluate model or prototype in a collaborative setting.<br><br>Optimize the final pop-up book product. |

| process—that is, some of those characteristics may be incorporated into the new design. (MS-ETS1-3) | Working in teams provides critical feedback to the maker for his or her improvement cycle. | Share the pop-up book with others. |
|---|---|---|
| MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. | Optimization is a reached within the constraints of time, space, money, and society. | |
| MS-ETS1.B (DCI): Developing Possible Solutions A solution needs to be tested, and then modified on the basis of the test results, in order to improve it. (MS-ETS1-4) | Sharing results of an engineering project is the final step in the design process. | |
| MS-ETS1.B (DCI): Developing Possible Solutions Models of all kinds are important for testing solutions. (MS-ETS1-4) | **VOCABULARY:** problem, brainstorm, constraint, design, innovation, invention, iteration, modify, prototype, troubleshoot, test, evaluate, optimize | |
| MS-ETS1.C (DCI): Optimizing the Design Solution The iterative process of testing the most promising solutions and modifying what is proposed on the basis of the test results leads to greater refinement and ultimately to an optimal solution. (MSETS1-4) | **KEY TERMS:** engineering, design process | |
| Art Standard 1.1.5.D.2: The elements of art and principles of design are universal. Compare and contrast works of art in various mediums that use the same art elements and principles of design. | | |

**ASSESSMENT EVIDENCE:**
- Completion of the final 3D story project
- Self-evaluation
- Peer-evaluation
- Teacher conferences
-

**KEY LEARNING EVENTS AND INSTRUCTION:**
- "Does It Fit?" (*Harvard Project Zero*)
- Revision of storyboard to include diagrams of specific paper fold elements
- Creation of prototype/model
- Peer teaching
- Cyclical revisions of models to optimize desired outcome
- Presentation of final 3D story project

| SUGGESTED TIME ALLOTMENT | CONTENT-UNIT OF STUDY | SUPPLEMENTAL UNIT RESOURCES |
|---|---|---|
| 4 Weeks | Unit III: Workshop | Engineering Design Graphic<br>http://www.jpl.nasa.gov/edu/pdfs/engineering_design_process_light.pdf<br><br>The Design Cycle<br>http://static1.squarespace.com/static/50f36339e4b07e77c4 681bee/t/5498c027e4b02f36a3b8411f/1419296814499/?format=750w<br><br>Ted-ED Popup book with the design process<br>https://www.youtube.com/watch?v=RZR_b753ZJ0<br><br>How to design your own pop-up cards<br>https://www.makepopupcards.com/how-to-design-your-own-pop-up-cards/ |

Appendix A

Book List

- **ISBN-13:** 978-0762440870
  Ayako Brodek (2011) *The New Encyclopedia of Origami and Papercraft Techniques*

- **ISBN-13:** 978-1899618095
  Birmingham, Duncan. (1997) *Pop Up! A Manual of Paper Mechanisms*

- **ISBN-13:** 978-0689822247
  Carter, D. A., & Diaz, J. (1999). *The elements of pop-up: A pop-up book for aspiring paper*

- **ISBN-13:** 978-0906212493
  Hiner, Mark (1986) *Paper Engineering for Pop-up Books and Cards*

- **ISBN-13:** 978-0688079024
  Irvine, Joans (1991) *How to Make Pop-Ups Paperback*

- **ISBN-13:** 978-0805028843
  Jackson, Paul (1994) *The Pop Up Book: Step by step instruction for creating over 100 paper projects.*

- **ISBN-13:** 978-1581805963
  Jacobs, Michael (2005) *Cards the pop up, flip and slide.*

- ISBN-13: 978-1850009092
  Johnson, P. (1992) *Pop-up paper engineering: Cross-curricular activities in design, technology, English, and art.*

- **ISBN-13:** 978-0486268378
  Johnson, P. (2012) *Creating with Paper: Basic Forms and Variations* (2012)

- **ISBN-13:** 978-1571204202
  Pridemore, Heidi. (2007) *Pop-Up Paper Structures: The Beginner's Guide to Creating 3-D Elements for Books, Cards & More*

Appendix B

Rubric 1: 3D Storyboard Rubric

| Grade Scale | Story Planning | 3D Element Planning | Artful Planning |
|---|---|---|---|
| 3 | Storyboard effectively communicates literary and visual elements. | There are four 3D elements described (sketched or annotated). | There is an impactful rationale for the design elements (ex: color, shape, texture, etc.) |
| 2 | Storyboard partially communicates some literary and visual elements. | There are three 3D elements described (sketched or annotated). | There is a rationale for the design elements (ex: color, shape, texture, etc.) |
| 1 | Storyboard displays minimal effort and is incomplete in some areas. | There are two 3D elements described (sketched or annotated). | There is no rationale for the design elements (ex: color, shape, texture, etc.) |

Appendix C

Rubric 2: 3D Story Final Project Rubric

| Grade Scale | 3D Elements *Technology Standards 8.2.8.C.3 NGSS Engineering Standards MS-ETS1-4; MS-ETS1.C (DCI)* | Written Story *CCSS ELA Standards W.7.3; W.7.3.a;W.7.3.c; W.7.3.d; W.7.4; L.7.2; L.7.2.b; L.7.3; L.7.3.a)* | Artful Thinking *Art Standards 1.1.5.D.2; 1.1.12.D.2* | Craftsmanship |
|---|---|---|---|---|
| 5 | Product displays the proper use of a paper system, includes four or more working paper folds. | Product includes a well-written story free of grammatical errors. Word choices effectively convey tone and mood. | Words and 3D elements are combined in original and surprising ways to tell an interesting story. Images and color choices effectively convey tone and mood. | The writing and visual elements were beautiful and carefully done; evidences high level of craftsmanship. |
| 4 | Product displayed proper use of a paper system, includes three working paper folds. | Product includes a well-written story with one or two grammatical errors. Word choices effectively convey tone and mood. | Words and 3D elements are combined in original and way to tell a story. Images and color choices effectively convey tone and mood. | With a little more effort, the work could have been outstanding; lacks the finishing touches. |
| 3 | Product displayed proper use of a paper system, however the project uses only two working paper folds. | Product includes well-written story but contains several grammatical errors OR little attempt to convey tone and mood through word choice. | Words and 3D elements are combined in ways that are derived from the thinking of others. Images and color choices somewhat convey tone and mood. | The student showed average craftsmanship; adequate, but limited thought and effort. |
| 2 | Product displays proper use of a paper system however it only includes one working paper fold. | Product includes a story with minimal development OR several grammatical errors OR no attempt to convey tone and mood through word choice. | Words and 3D elements are combined in ways that are derived from the thinking of others. Words and 3D elements do not work together to convey the story's tone and mood. | The student showed average craftsmanship, rushed to finish product with time remaining and improved minimally. |
| 1 | Product does not display proper use of a paper system and includes no working paper folds. | Product does not include a written story. | Ideas are copied or restated from the sources consulted. No evidence of thoughtful use of image and color. | The student showed poor craftsmanship; rushed to finish product with time remaining; no improvements made. |