



64TH CONFERENCE ON EXCEPTIONAL CHILDREN
WORKING TOGETHER
TO ACHIEVE STUDENT SUCCESS

**Text Structures & Scaffolds for
Informational & Argument
Writing: Grades 4-12**

Joan Sedita
www.keystoliteracy.com

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Content Writing = Writing to Learn

“As students write about science, math, and social studies, they elaborate and clarify their ideas. It’s not just an expression of what you know. In the act of writing, students also form new relationships among ideas. Writing helps students integrate their thoughts.” (Walker, 2009)

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Thinking on Paper

Writing about text or from classroom instruction helps students:



- *Think and make connections between what they are learning and what they already know*
- *Organize their thoughts*
- *Clarify and solidify what they have learned*

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Basic Text Structures

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CC Connection

- **Writing #1**
 - Write *opinions/arguments* to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence.
- **Writing #2**
 - Write *informative/explanatory* texts to examine a topic and convey ideas and information clearly.
- **Writing #3**
 - Write *narratives* to develop real or imagined experiences or events using effective technique, well-chosen details and well-structured event sequences.

Which one should I start with?

1-3

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Introduction

- Introduce the topic of the writing piece

Body: Development of Ideas

- Organize information
- Present main ideas
- Provide details
- Include text features

Conclusion

- Concluding statement that supports the information presented

Transitions

- Words/phrases that connect sentences and paragraphs

Basic Text Structures

1-3

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<h3>Text Features</h3> <ul style="list-style-type: none">• title• headings/subheadings• graphics, charts, maps• captions• table of contents• index• glossary	<h3>Basic Text Structures</h3> <ul style="list-style-type: none">• Sentences• Paragraphs• Introduction, body, conclusion• Larger portions of text<ul style="list-style-type: none">– section– chapter– Scene (play)– Stanza (poem)
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Text Structure Cards

```
graph TD; A[Overall Topic] --> B{Introduction}; A --> C{Body}; A --> D{Conclusion};
```

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Analyze Sample Writing

- **Bracket the introduction.**
Did the student clearly identify the topic of the piece?
- **Bracket the conclusion.**
Did the student provide closure and sum up the piece?
- **Look at the body.**
 - *How is the body organized?*
 - *Are there sections with headings?*
 - *Are graphics included to aid comprehension?*

4-7

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3 Types of Writing

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```
graph TD; A[Types of Writing] --> B[Opinion/Argument]; A --> C[Informational]; A --> D[Narrative]; B --> E[to convince]; C --> F[to inform or explain]; D --> G[to tell a story];
```

AND... Combination

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Suggested Distribution

Elementary	High School
1/3 argument	40% argument
1/3 informational	40% informational
1/3 narrative	20% narrative

Encourage students to use the vocabulary related to the 3 types of writing

Find opportunistic moments to point out writing types in text that students read.

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Informational Writing

Examines previously learned information or provides new information.

Text structure:
Sections and paragraph main ideas tend to be organized hierarchically.

Examples

- Textbook
- Article
- Letter, speech
- Instructions, manual, directions
- Subject area report
- Summary (of info)
- Workplace: memo, application, resume

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Informational

*4 body paragraphs,
no subtopics or headings*

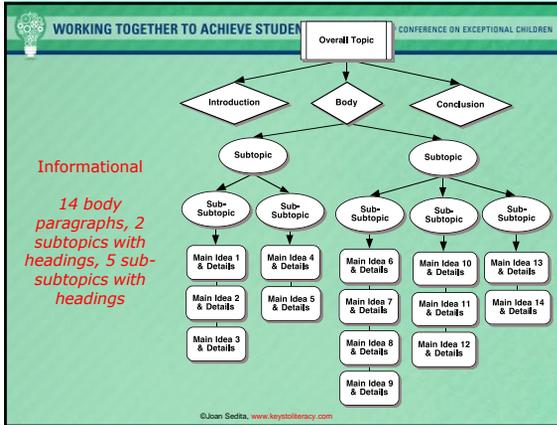
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Informational

*7 body paragraphs,
2 subtopics with headings*

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Argument (Opinion) Writing

Gives an opinion or makes an argument to convince the reader that a point of view is valid or to persuade the reader to take a specific action.

Text structure:
Organized based on these components: claim, reason, evidence, counter-claim, rebuttal

Examples

- Persuasive letters
- Editorials
- Argument essays
- Reviews of books or movies
- Claims about the worth or meaning of a literary work

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Terminology

Argument writing



... is **not** the same as **having an argument** (i.e., altercation, quarrel) with someone!

Argument writing
... for grades 6+

Opinion writing
Young children develop a variety of methods to extend and elaborate their opinions by providing examples, offering reasons for their assertions, and explaining cause and effect. These are steps on the road to argument.

In grades K–5, the term “opinion” is used to refer to this developing form of argument.

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Informational & Argument

- Information is provided in both
- Aims are different
 - **Opinion/Argument:**
 - May only present some information
 - Uses select information to try to convince others of a valid position
 - **Informational:**
 - Presents all relevant information
 - Seeks to inform others and make them understand

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Specific Purposes

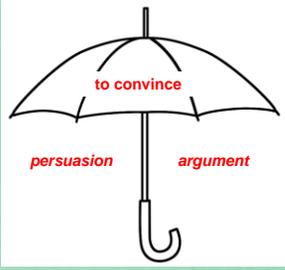
Informative	Argument
<ul style="list-style-type: none">- To inform- To describe- To define- To review- To notify- To instruct- To advise- To announce- To explain- To demonstrate- To illustrate	<p>To inform, plus:</p> <ul style="list-style-type: none">- To persuade- To convince- To influence- To argue- To recommend- To change- To advocate- To urge- To defend- To justify- To support

Johnson-Sheehan & Paine, (2012) *Writing Today*. Longman.

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Persuasion vs. Argument

Often used interchangeably, goal for both is **to convince**



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Persuasion vs. Argument

- **Persuasion:**
 - Take a personal position about something and try to persuade the reader to agree with you; win the reader over to your side
 - Appeal to the audience's emotions or self-interest
- **Argument:**
 - Show that you have a valid argument, allowing the reader to adopt your position or not
 - Convinces audience with merit and reasonableness of claims and proofs
 - Has a claim, evidence, and a more formal style

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Student: *I don't think we should have any homework this week.*

Teacher: *Why not?*

<p>Persuasion</p> <p>You would be the best teacher if you let all of us take a break from homework! We will work extra hard in class. A lot of the other teachers are skipping homework, so won't you please do the same?</p>	<p>Opinion/Argument</p> <p>Because there are a lot of away games this week, a lot of the students in our class won't be home. Some people try to work on the bus, but it's hard to write because it shakes. Also, some people feel sick reading on the bus. It's true we could do homework when we get back, but by then it's late and everyone is tired.</p>
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Argument Components

- **Claim:** *the position taken by the writer; what the writer is trying to prove or argue*
- **Reason:** *provided to support a claim; reasons are supported by evidence*
- **Evidence:** *use to support or prove a reason; statistics, facts, quotations, surveys, etc.*
- **Counterclaim:** *opposing position, counterargument*
- **Rebuttal:** *refutes or disproves the counterclaim; addresses the criticism of the claim*

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Simply put...

- **Claim:** What do I think?
- **Reason:** Why do I think it?
- **Evidence:** How do I know (proof)?
- **Counterclaim:** What is the other side?
- **Rebuttal:** My response to the other side?

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Argument Topic Web

Opinion/Argument Piece
2 Reasons

```
graph TD; OT[Overall Topic] --> I{Introduction}; OT --> B{Body}; OT --> C{Conclusion}; I --> CL[CLAIM]; B --> R1[Reason 1 & Supporting Evidence]; B --> R2[Reason 2 & Supporting Evidence];
```

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Argument Topic Web

Opinion/Argument Piece
3 Reasons
1 Counter-Claim with Rebuttal

```
graph TD; OT[Overall Topic] --> I{Introduction}; OT --> B{Body}; OT --> C{Conclusion}; I --> CL[CLAIM]; B --> R1[Reason 1 & Supporting Evidence]; B --> R2[Reason 2 & Supporting Evidence]; B --> R3[Reason 3 & Supporting Evidence]; B --> CC[Counter-Claim]; CC --> R[Rebuttal];
```

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More About Basic Text Structures

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- Can range from one sentence to a page+
- Essential component:
 - *Introduction of topic*
- Possible components:
 - *Catchy "lead"*
 - *Presentation of background/overview information*
 - *Preview of subtopics*
 - *Thesis statement*
- Lets the reader know what the writing is going to be about, BUT...
 - ... avoid flatly announcing what you are about to do
 - *In this paper, I will argue that...*
 - *The purpose of this essay is to inform you that...*

Introductions

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Nonfiction Leads

- **Examples:** Pose a question, start with a quote, present fascinating facts, provide an anecdote, make the reader part of the piece.
- When students practice writing leads, it reminds them to use **language that will engage the reader.**
- The task, audience and purpose will inform if a lead is needed and which type is best.

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Look at the sample introductions.

- *Did the student successfully introduce the topic?*
- *Did the student include a lead?*
- *Did the student preview the subtopics?*
- *Did the student include any background information?*

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Conclusions

- Used to sum up the information presented.
- Creates closure and holds the whole text together by referring back to what has already been said.
- Length: sentence, paragraph, section

Three Goals

1. Rephrase the main topic or claim
2. Summarize key main ideas or reasons
3. Leave the reader with a sense of closure, interesting final impression, or call to action

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Look at the sample conclusions.

- *Does the writer rephrase the main topic?*
- *Does the writer summarize the key main ideas?*
- *Does the writer leave the reader with a sense of closure or an interesting final impression?*

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Transitions

- What is a transition?
 - Linking words, phrases, sentences and even paragraphs
 - Use to link sentences, paragraphs, and sections of text
- Used to
 - Clarify relationships (e.g., compare/contrast, cause/effect)
 - Create cohesion
 - Link ideas
- Some students include while writing first draft, some need to consciously add them later.

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Writing an Informational Piece Using Sources

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Information Writing: Set of Steps

1. Review the assignment requirements
2. Identify print or digital sources
3. Gather information from sources into two-column notes
4. Organize notes into a writing plan
5. Write draft
6. Revise and edit draft

The Process Writing Routine

Think
Plan
Write
Revise

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Gathering Information *into* Two-Column Notes

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Take Notes

- Information gathered **needs to be saved**.
- **Two-column** notes are helpful for gathering and saving information.
- Writing during the *Think* stage can **help students discover and think through** what they want to convey in their writing.
- Students should **start to track** sources.

Writing #8
*Gather relevant information from multiple print and digital sources... integrate the information **while avoiding plagiarism**.*

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Two-Column Notes:

To gather information before writing

Topic _____

Main Ideas	Details
------------	---------

*Assumption:
students can
identify and
state main ideas*

*Assumption:
students can identify
relevant details,
paraphrase in their
own words, write
concisely*

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Practice Activity

- Write a short informational piece based on sources about 3D printers.
- Requirements:
 - Introduction that starts with a non-fiction lead and includes the overall topic being explained
 - Body that describes what 3D printers are, how they work, and what they can make
 - Use transitions
 - Use information from both sources; track your sources during note taking

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Practice: Marking Text

- Start with Source A
- Follow along as the trainer models marking the text to gather information.



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Practice: Taking Notes

- Follow along as the trainer models note taking. Add notes to your handout.
- Students can avoid plagiarism by taking notes in their own words.
- Assumed skills:
 - Paraphrasing – using your own word order, substituting your own language
 - Writing concisely
 - Abbreviating
 - Using quotes when copying text wording
 - Adding visual and word clues

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First Section of Notes

What are 3D printers?

(will be used to develop a topic sentence)

- "The Cube: your own personal mini-factory" **(A)**
- Different from traditional way of making things **(B)**
- 3D printing also called "additive manufacturing" **(B)**
- \$2.2 billion of 3D printers sold across the world **(B)**

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Second Section of Notes

How 3D printers work

(will be used to develop a topic sentence)

- How it works **(A)**
 1. melts plastic from cartridge
 2. Builds layers to create item
- download directions to make things **(A)**
- different way to make things - builds an object from bottom up **(B)**
- very thin layers of material are added on top of each other **(B)**
- process is guided by computers **(B)**
- 3D printers use different processes, most use powdered plastic **(B)**
- has 2 major parts: **(B)**
 1. "build box" – holds the powder
 2. "printing head" – has heat source that melts powder, or jets that spray binder glue over powder

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Third Section of Notes

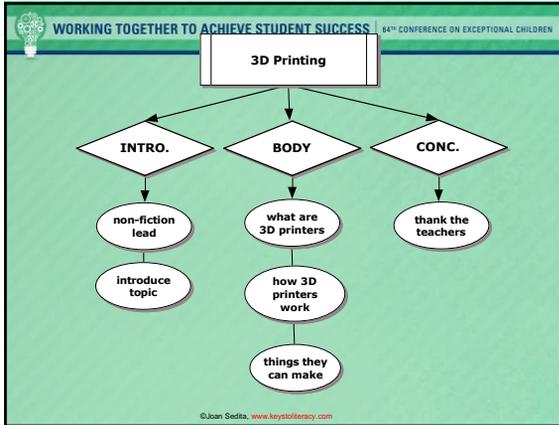
Things they can make

(will be used to develop a topic sentence)

- makes plastic items **(A)**
- advanced 3D printers have made fascinating things **(A)**
 - bionic ear – can send & receive sound
 - digital model of King Richard III's head
 - clothing – shoe, dress out of nylon mesh
 - replicas of mastodon bones
 - meat made from animal cells and amino acids



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Practice: Write an Introduction

“Write a short informational piece, based on sources, about 3D printers.”

Lead → *Have you ever found yourself in need of an accessory for Friday night or a spare part for a home project? The futuristic idea of manufacturing things right in your own home is no longer just an idea on the latest episode of The Jetsons.*

Introduction of topic → *Three-dimensional printers are now widely available. They work differently from traditional printers, and can make a wide variety of 3D objects.*

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Using Notes to Write Paragraphs

- From two-column notes:
 - The wording in the left column is developed into a full sentence that states the main idea – the **Topic Sentence**
 - The wording in the right column is developed into support sentences

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Practice Assignment

“Write a short informational piece, based on sources, about 3D printers.”

Follow along as the trainer does a think aloud to model how to turn notes into sentences for paragraphs.

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First Section of Notes

What are 3D printers?

TS: *There is a new product for 3D printing available to the public.*

- 1 • “The Cube: your own personal mini-factory” (A)
- 4 • Different from traditional way of making things (B)
- 2 • 3D printing also called “additive manufacturing” (B)
- 3 • \$2.2 billion of 3D printers sold across the world (B)

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First Body Paragraph

There is a new product for 3D printing available to the public. For example, “The Cube” is a 3D printer that allows you to have “your own personal mini-factory”. (A) Another name for 3D printing is “additive manufacturing”. (B) There is a growing market for 3D printing. That is why 3D printers had \$2.2 billion worth of sales across the world last year. (B) Printing in 3D is different from the traditional way of making things. (B)

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Second Section of Notes

How 3D printers work

TS:
A 3D printer creates objects differently from traditional printers.

1. how it works (A)
 1. melts plastic from cartridge
 2. Builds layers to create item
3. download directions to make things (A)
2. different way to make things - builds an object from bottom up (B)
3. very thin layers of material are added on top of each other (B)
4. process is guided by computers (B)
1. 3D printers use different processes, most use powdered plastic (B)
 1. "build box" - contains finely ground material
 2. "printing head" - has heat source that melts powder, jets that spray binder glue over powder

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Second Body Paragraph

A 3D printer creates objects differently from traditional printers. They use different processes and materials, but most use powdered plastic. (A, B) 3D printers are different from 2 dimensional printers because they build an object from the bottom up. (B) They spray very thin layers of the building material on top of each other, like layers in a cake. (A, B) Also, the process of 3D printing is guided by computers. (B) Directions for making things are downloaded electronically to the 3D printer. (A)

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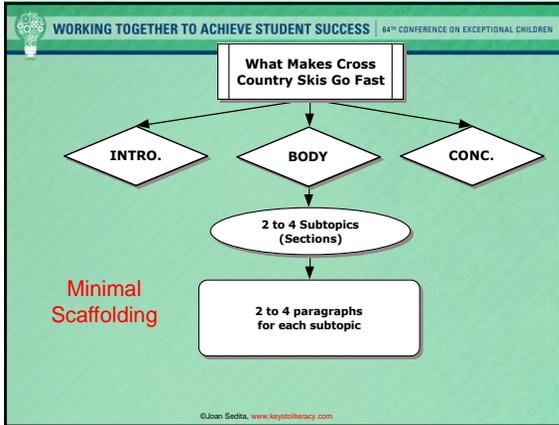
Scaffolds

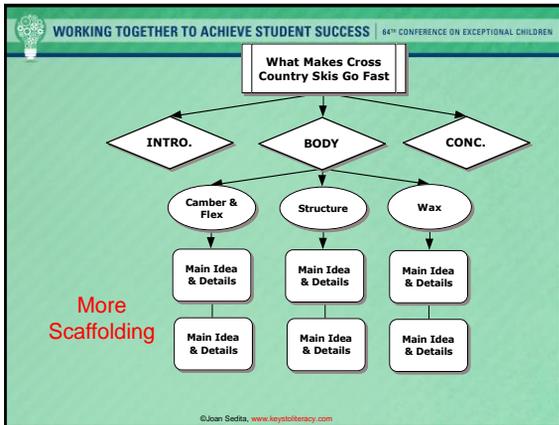
- Extra support that we provide and gradually release
- Examples of scaffolds:
 - Think aloud
 - Models of writing to emulate - mentor text and student samples
 - Writing scaffolds
 - Two-column notes
 - Top-down topic webs
 - Sets of steps
 - Writing templates

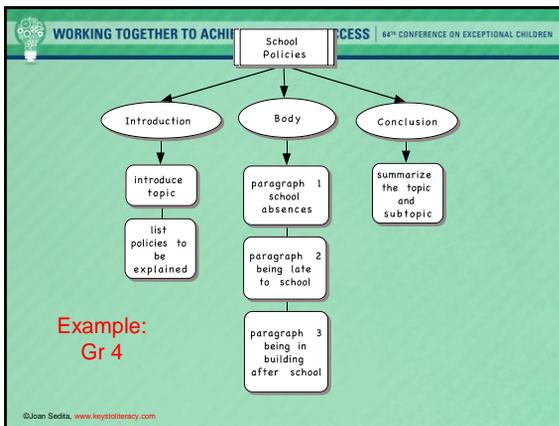


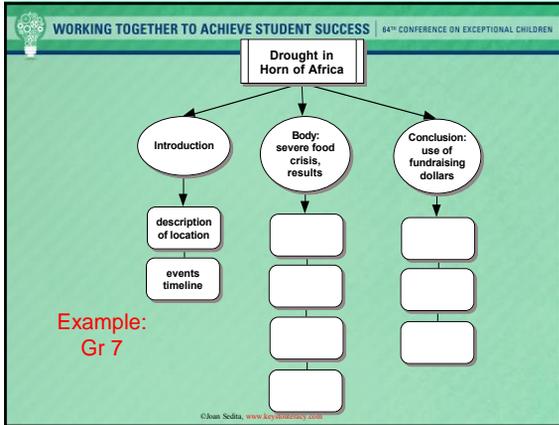
Teacher Planning Required!

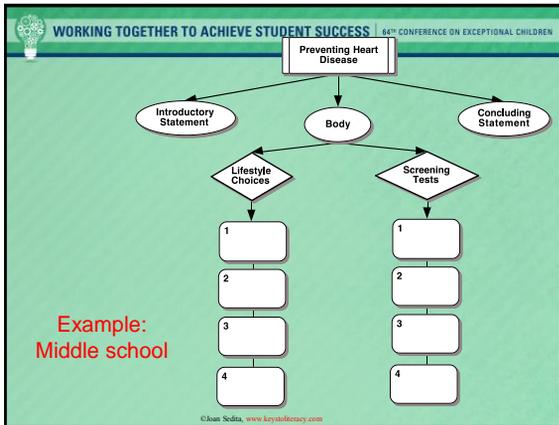
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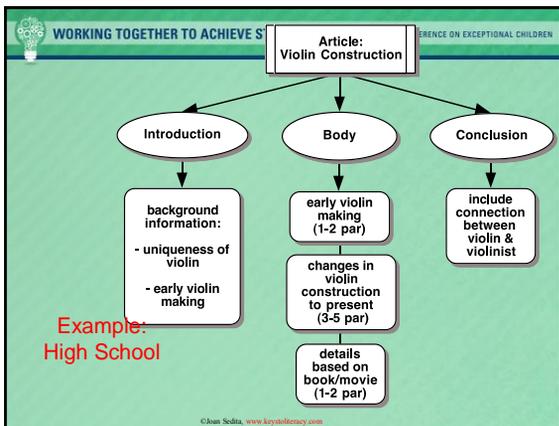


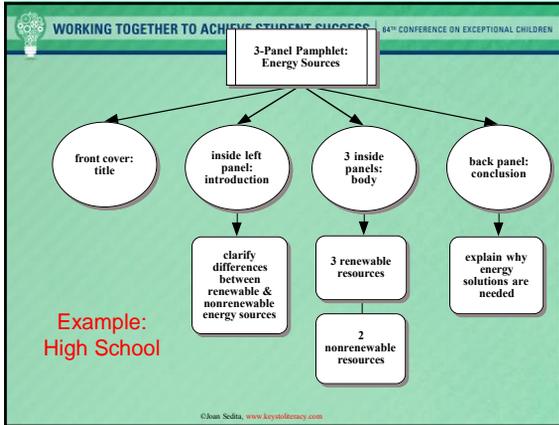












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Set of Steps

- Writing requires implementation of multiple processes.
- A process can be task-analyzed into a set of steps.
- Gradually release the scaffold once students follow them automatically.

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Examples

- How to write a summary (p. 124)
- How to write an information piece (p. 125)
- How to write an argument piece (p. 125)
- Writing a research report: Grades 4-5 (p. 126)
- Writing a research report: Grades 6-12 (p. 127)
- How to write an overview of a news article (p. 128)

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Writing Templates

- Provides more support than a Set of Steps.
- Provides space for students to write introductions, bodies, conclusion, notes from sources, etc.
- Gradually release the scaffold as students become more independent.
- Consider accepting a completed writing template as a first draft.

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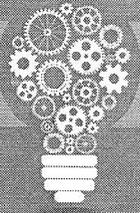
Examples

- **Summary template** (p. 129)
- **Information writing template** (p. 130)
- **Opinion writing template** (p. 131)
- **Friendly opinion letter template** (p. 132)
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WORKING TOGETHER TO ACHIEVE STUDENT SUCCESS

64TH CONFERENCE ON EXCEPTIONAL CHILDREN

Text Structures & Scaffolds for Informational & Argument Writing: Grades 4-12

Joan Sedita
joan@keystoliteracy.com



CCSS: Opinion/Argument Standards

Anchor Standard	Grade-Specific Details
<p>#1 Write opinion/argument pieces</p> <p><i>(H/SS,S,TS: write arguments focused on discipline-specific content)</i></p>	<ul style="list-style-type: none"> • 4 – 5: Write opinion pieces on topics or texts, supporting a point of view with reasons and information. • 6 – 8: Write arguments to support claims with clear reasons and relevant evidence. • 9 – 12: Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence.
<p>#1a Introductions</p>	<ul style="list-style-type: none"> • 4 – 5: Introduce a topic or text clearly, state an opinion, and create an organizational structure in which related ideas are grouped to support the writer’s purpose. • 6: Introduce claim(s) and organize the reasons and evidence clearly. • 7: Introduce claim(s), acknowledge alternate or opposing claims, and organize the reasons and evidence logically. • 8: Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. • 9 – 10: Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence. • 11 – 12: Introduce precise, knowledgeable claim(s), establish the significance of the claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that logically sequences claim(s), counterclaims, reasons, and evidence.
<p># 1b Support/Develop Claims</p>	<ul style="list-style-type: none"> • 4: Provide reasons that are supported by facts and details. • 5: Provide logically ordered reasons that are supported by facts and details. • 6 - 8: Support claim(s) with clear reasons and relevant evidence, using credible sources and demonstrating an understanding of the topic or text. • 9 – 10: Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience’s knowledge level and concerns. • 11 – 12: Develop claim(s) and counterclaims fairly and thoroughly, supplying the most relevant evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience’s knowledge level, concerns, values, and possible biases.
<p># 1c Linking Words/Transitions</p>	<ul style="list-style-type: none"> • 4: Link opinion and reasons using words and phrases (e.g., <i>for instance, in order to, in addition</i>). • 5: Link opinion and reasons using words, phrases, and clauses (e.g., <i>consequently, specifically</i>). • 6: Use words, phrases, and clauses to clarify the relationships among claim(s) and reasons. • 7-8: Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), reasons, and evidence. • 9 – 10: Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. • 11 – 12: Use words, phrases, and clauses as well as varied syntax to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims.

# 1d Formal Style	6 – 8: Establish and maintain a formal style. 9 – 12: Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
# 1 d (4 – 5) # 1 e (6 – 10) Conclusions	4 – 5: Provide a concluding statement or section related to the opinion presented. 6: Provide a concluding statement or section that follows from the argument presented. 7 – 12: Provide a concluding statement or section that follows from and supports the argument presented.

CCSS: Informational Standards

Anchor Standard	Grade-Specific Details
#2 Write informative/explanatory text <i>(H/SS,S,TS: Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes)</i>	<ul style="list-style-type: none"> • 4 – 5: Write informative/explanatory texts to examine a topic and convey ideas and information clearly. • 6 – 8: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content. • 9 – 12: Write informative/explanatory texts to examine and convey complex ideas, concepts, and information clearly and accurately through the effective selection, organization, and analysis of content.
# 2a Introductions/Organization	<ul style="list-style-type: none"> • 4: Introduce a topic clearly and group related information in paragraphs and sections; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. • 5: Introduce a topic clearly, provide a general observation and focus, and group related information logically; include formatting (e.g., headings), illustrations, and multimedia when useful to aiding comprehension. • 6: Introduce a topic; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. • 7: Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information, using strategies such as definition, classification, comparison/contrast, and cause/effect; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. • 8: Introduce a topic clearly, previewing what is to follow; organize ideas, concepts, and information into broader categories; include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when useful to aiding comprehension. • 9 – 10: Introduce a topic; organize complex ideas, concepts, and information to make important connections and distinctions; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension. • 11 – 12: Introduce a topic; organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., features, tables), and multimedia when useful to aiding comprehension.

<p># 2b Develop the Topic</p>	<ul style="list-style-type: none"> • 4 – 5: Develop the topic with facts, definitions, concrete details, quotations, or other information and examples related to the topic. • 6 - 7: Develop the topic with relevant facts, definitions, concrete details, quotations, or other information and examples. • 8: Develop the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples • 9 – 10: Develop the topic with well-chosen, relevant, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic. • 11 – 12: Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.
<p># 2c Linking Words/Transitions</p>	<ul style="list-style-type: none"> • 4: Link ideas within categories of information using words and phrases (e.g., <i>another, for example, also, because</i>). • 5: Link ideas within and across categories of information using words, phrases, and clauses (e.g., <i>in contrast, especially</i>). • 6: Use appropriate transitions to clarify the relationships among ideas and concepts. • 7 – 8: Use appropriate and varied transitions to create cohesion and clarify the relationships among ideas and concepts. • 9 – 10: Use appropriate and varied transitions to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts. • 11 – 12: Use appropriate and varied transitions and syntax to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.
<p># 2d Precise Language</p>	<ul style="list-style-type: none"> • 4 – 8: Use precise language and domain-specific vocabulary to inform about or explain the topic. • 9 – 10: Use precise language and domain-specific vocabulary to manage the complexity of the topic. • 11 – 12: Use precise language, domain-specific vocabulary, and techniques such as metaphor, simile, and analogy to manage the complexity of the topic.
<p># 2e Formal Style</p>	<ul style="list-style-type: none"> • 6 – 8: Establish and maintain a formal style. • 9 – 12: Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing.
<p># 2 e (4 – 5) # 2 f (6 – 10) Conclusions</p>	<ul style="list-style-type: none"> • 4 – 6: Provide a concluding statement or section related to the information or explanation presented. • 7 – 8: Provide a concluding statement or section that follows from and supports the information or explanation presented • 9 – 12: Provide a concluding statement or section that follows from and supports the information or explanation presented (e.g., articulating implications or the significance of the topic).

Cross-Country Skis: What Makes Them Go Fast

(1) When you are going down a hill on skis, attempting to go as fast as possible, you will probably try to get your body into the lowest tuck possible. But wait - your position on skis isn't the only thing that makes you go fast, and definitely not the most important. What really makes you go fast is the *camber* and *flex* of your skis, the *structure* of the ski base, and the *waxes* that you use.

Camber and Flex

(2) The ski is not flat. There is a bend in the ski that creates an arch, and if you put a ski flat on the ground without any weight on it, there will be space under the middle of the ski. This bend is called *camber*. The camber flexes and distributes most of your weight on the ski to the tips and tails and leaves a little space under the ski where your foot is. If there were not camber, or too little camber, your weight would push the middle of the ski flat to the ground, creating more friction and making you go slower. This is why having the right type of ski for your weight is very important. If the ski is just right, meaning the right amount of space under your ski is in the right place, then you will go fast.

(3) Your body position affects the *flex* of the ski. Many people think that getting in the lowest and most forward tuck will make you go fastest. Aerodynamically, that is pretty true, but aerodynamics doesn't play that big a part in how fast you go (Holden, 1998). In terms of flex, you definitely don't want to lean forward (Caldwell, 2003). When you move your body forward, that makes the ski distribute your weight to the front of the ski. This digs the tip of the ski into the snow, slowing you tremendously. The optimal position for gliding downhill is to have your weight centered over the ski, if not putting a little weight back on the heel. This makes the most even distribution of weight to the tips and tails of your skis, without having too much weight on the front (Caldwell, 2003). (See fig. A)

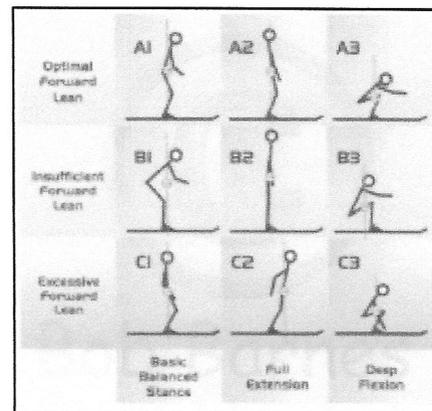


Figure A

Structure

(4) Another factor that affects how fast your skis glide is something called *structure*. Structure, as known in micro grooves, is a series of grooves in the thin layer of plastic that comes in contact with the snow, as known as Ptex, that channel the snow particles along the base of the ski.

(5) There are two basic types of structure, *linear* structure, which are long parallel grooves running all the way along the base, and *cross* structure which has long grooves but also grooves that run across the base. (See fig. B) A good combination of these two structure types is the fastest. Linear structure works by reducing friction between the snow and the Ptex by channeling the snow crystals down along the base. Cross structure does the same thing but because of the grooves that run across the base, as the ski slides along the snow, the snow crystals "jump" from groove to groove as they go down the base (Underwood and Alexander,

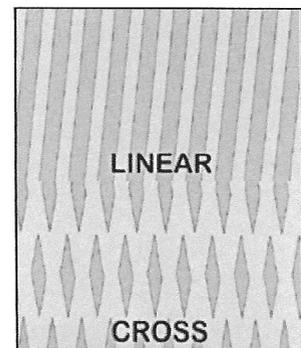


Figure B

1998, p. 1). Now remember, all this is happening almost microscopically under the ski. This turbulence helps to break the surface tension and suction between the ski and snow. Once the section is broken, the ski will travel much faster. Wax also helps do the same thing.

Wax

(6) As you probably know, wax is melted in to the base of skis to make them go faster in certain snow conditions. But what I bet you don't know is how the wax makes your ski go faster. The Ptex is not completely solid, but has microscopic holes in it called *sinters* that are in a sort of honeycomb shape. The sinsters absorb the wax into the base of the ski. If the base is dry, the sinsters close and the wax is not absorbed properly. To prevent getting a dry base, regularly wax your skis.

(7) The wax works the same two ways as the structure. It either reduces friction between the snow and the ski, or keeps snow and water from creating suction with the base. Wax reduces friction by actually changing the hardness of the base (Caldwell, 2003). There are many kinds of wax, for all different temperature ranges. Warmer wax softens the base for warmer snow conditions and colder wax hardens the base for colder snow.

(8) As you have seen, there are many contributing factors to how fast you glide on cross-country skis. The flex, structure, wax, and body position all depend on each other to work properly to make you go fast. A ski that is right for your body weight, a good combination of linear and cross structure, and the right wax for the snow temperature will ensure that you go as fast as possible down the hill.

Bibliography

Caldwell, Zach. (2003, February, 6).

Underwood, John and Alexander, Erica. (1998). Skis and Stones Finally Mix.
<http://nensa.northcottweb.com/articles/nenn@htm> (2/7/03).

Holden, Michael S. (1998, Feb.) "The Aerodynamics of Skiing," Scientific American, Pg. 3.

Source: Vermont Department of Education, November 2003.
http://education.vermont.gov/documents/grade_8_1_8_report.pdf

Geothermal Energy Now

(1) Think about how much electricity you use every day. Your alarm clock, your radio, your computer, and the lights in your home and at school all use electricity. Now think of all the other people in your community, in your state, and in the country who use as much electricity, if not more. The problem is the process that provides most of this electricity damages the environment. We need to devote more time, energy, and money to develop geothermal energy because it is renewable and a less harmful source of energy.

(2) Geothermal energy is energy that we can capture directly from Earth's heat. Miles and miles beneath Earth's surface hot molten rock heads a part of the Earth's crust. Then the molten rock causes underground water supplies to heat up. They are geothermal pools. Wells are drilled to pump the steam from these pools to use for heat or in power plants to make electricity.

(3) One argument for geothermal energy is that it is a renewable resource. Experts estimate that there is 15,000 times more geothermal energy than all the oil reserves in the world and most of that energy is constantly replenished. This evidence shows that we will never run out of geothermal energy the way we will with oil and gas. Experts estimate that geothermal energy is higher than all the fossil

Plant type	CO ₂ kg/MWh	SO ₂ kg/MWh	NO _x kg/MWh	Particulates kg/MWh
Coal-fired	994	4.71	1.955	1.012
Oil-fired	758	5.44	1.814	N.A.
Gas-fired	550	0.0998	1.343	0.0635
Hydrothermal - flash-steam, liquid dominated	27.2	0.1588	0	0
Hydrothermal - The Geysers dry steam field	40.3	0.000098	0.000458	negligible
Hydrothermal - closed-loop binary	0	0	0	negligible
EPA average, all U.S. plants	631.6	2.734	1.343	N.A.

N.A. = not available

fuels and uranium used for nuclear plants combined.

(4) The most important advantage of geothermal energy is that it doesn't produce pollution or contribute to the greenhouse effect. Geothermal plants are almost entirely emission free. The US Department of Energy states that more than 50% of the electricity used in the United States comes from coal. Coal is known to release harmful gasses, such as carbon dioxide, that contribute to air pollution. The result is that every time half the households in the country flip a light switch, a little bit more pollution leaks into the air. Studies conducted by scientists at the US Department of Energy point that geothermal power plants produce less than 1% of the carbon dioxide released by power plants relying on fossil fuels, such as coal. This fact means that when more and more power plants switch to geothermal energy instead of burning coal, the air in our country will greatly improve.

(5) Some people would argue that taking advantage of geothermal energy is expensive because of the cost of building power plants. But let's take a closer look. Technological changes have been made that make it easier to drill wells that can reach into geothermal pools. Iceland already generates more than 25 percent of its energy from geothermal. The more geothermal energy is used the lower the price will become to build. The chart shows that geothermal is the lowest cost of all heating fuels. It is true that the first costs for building geothermal plants is high, but lifetime costs of geothermal operations are smaller than other kinds of energy. Also the U.S. government has offered tax credits for individuals who use the technology in their homes.

Type of Energy	BTU/unit	Adj Effic	\$/unit	\$/MMBtu
Fuel Oil, gallon	138,200	80%	\$3.62	\$32.70
Kerosene, gallon	136,600	80%	\$3.98	\$36.43
Propane, gallon	91,600	80%	\$3.39	\$46.29
Natural Gas, therm	100,000	80%	\$1.55	\$19.40
Electricity, kwh	3,412	100%	\$0.15	\$43.46
Geothermal, kwh	3,412	400%	\$0.15	\$10.87
Wood, cord (green)	22,000,000	60%	\$180.00	\$13.64
Pellets, ton	16,400,000	80%	\$247.00	\$18.83

Note: MMBtu equals 1 Million Btus

(6) Geothermal energy hasn't beaten fossil fuels in any popularity contests yet, but scientists are hopeful that it may one day be a workable substitute to nonrenewable energy sources. The sooner we start exploring how to take advantage of it, the better it will be for our environment and our future.

Adapted From:

Writing: Literacy in history/social studies, science, and technical subjects – science argument essay. Retrieved on May 15, 2013 from http://macmillanmh.com/ccsreading/treasures/grade6/ccslh_g6_wr_6_1a_tl2.html Copyright © McGraw-Hill School Education Group

Analyze the Introductions

1. Did the student successfully introduce the topic?
2. Did the student include a lead? Which type?
3. Did the student preview the subtopics?
4. Did the student include any background information?

	<i>intro the topic?</i>	<i>lead?</i>	<i>preview?</i>	<i>back-ground?</i>
<p>Grade 4 Have you ever been in trouble and wanted to get away? The white-tailed deer can swim, run, hide, and fight to stay out of trouble. If you want to know how they do it, read on.</p>				
<p>Grade 6 Can you imagine hearing the howl of a wolf during the night? A while ago you could hear howls in northern Wisconsin, but now you cannot. The wolf population was eliminated up through the 1950's. Ranchers and the federal government played major roles in eliminating wolves.</p>				
<p>Grade 8 Captain Kirk of the <i>USS Enterprise</i> beams you aboard. As your molecules come back together, he gives you a tour of the spotless flight deck. It's filled with clean crew members working on equipment that's all in perfect shape. That's TV. The Russian <i>Mir</i> space station is reality, and life there isn't glamorous. Astronauts have to face many struggles while on board <i>Mir</i>.</p>				
<p>Grade 10 King Louis XIV appointed himself the "Sun King" because he felt he shined in France. He did, in fact, shine; not only in France but over all of Europe. One of his greatest accomplishments was the construction of the palace of Versailles. Versailles became the prestigious center of France's distinguished government. Many other countries tried to duplicate Versailles in hopes that their countries would be as successful as France. The grandness of Versailles symbolizes the greatness of France during the reign of King Louis XIV.</p>				

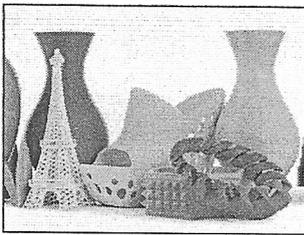
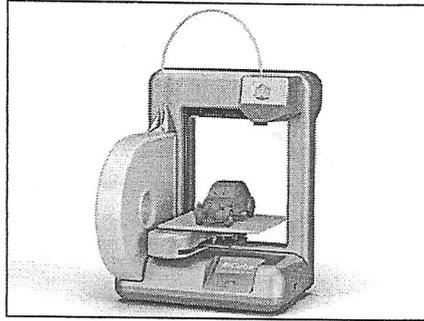
Analyze the Conclusions

- Does the writer rephrase the main topic?
- Does the writer summarize the key main ideas?
- Does the writer leave the reader with a sense of closure or interesting final impression?

	<i>rephrase topic</i>	<i>summarize main ideas</i>	<i>closure, impression</i>
<p>Grade 4 Deer stay safe by hiding, swimming, running, and fighting. Whenever you see a deer raise its tail, you know that it has seen a predator.</p>			
<p>Grade 8 Even though life on <i>Mir</i> isn't glamorous and equipment often fails, the <i>Mir</i> astronauts have had lots of success. Like the pioneers, they have found many useful things that help explorers who follow them. But maybe <i>Mir</i>'s greatest success is that astronauts from Russia and the U.S., two old enemies, have worked together as friends.</p>			
<p>Grade 10 When you walk into Versailles it is truly an amazing sight. The impact of the palace stays with you for a long time. That is exactly the impact that Louis XIV had on France and then the world. Louis worked hard to make Versailles just as glorious as he was, and it worked. Versailles truly is the grand symbol of the greatness of Louis XIV's reign.</p>			

What Cool Things Can 3D Printers Make?

Yes, 3D printing's made the jump to your home—but scientists are using it for much, much more than you could ever have imagined. Now on store shelves is a new breed of device that may transform your home: the 3D printer.



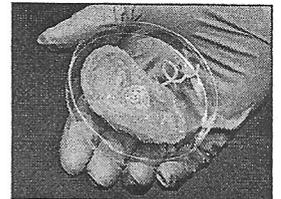
The Cube (from Cubify) makes the widely discussed future of digital technology accessible. Consider it your own personal mini-factory for \$1,299. Here's how it works: The unit melts plastic from cartridges you buy (like normal printer ink) and layers it over and over again to create desired items. Want a new bracelet for a night on the town, a set of coasters for tomorrow's potluck, or a toy rocket ship for the kid? You can download models for the printer to make these items and many more.

The at-home Cube can make almost anything you can think of...

... as long as your imagination is limited to inanimate plastic objects. However, exciting advances may be coming soon, as scientists push the boundaries and experiment with raw materials. One day soon, you might print your lunch or even the clothes you wear to work. Here, the innovative—and often bizarre—stuff advanced 3D printers can make right now.

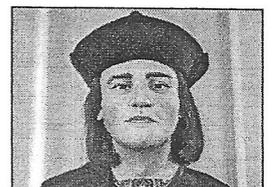
An Ear in a Petri Dish

Patients in need of new organs could soon be in luck. Researchers at Princeton University earlier this year created a so-called bionic ear that can both send and receive sound. The fleshy concoction reportedly started with cells from a cow, a little bit of gel, and some silver, which a printer made into the shape of an ear. Scientists hope the new body part will interface with personal computers in the future.



A King's Head

After archaeologists dug up the bones of King Richard III beneath a parking lot in Leicester, England, this year, forensic artists made a digital model of the royal leader's head and printed an incredibly lifelike version with 3D technology. Everything from Richard III's crinkled eyelids to his flowing dark hair was painstakingly re-created.



Fashionable Apparel

In 2012, designer Janina Alleyne printed a runway-ready shoe called the Exoskeleton. And this past spring, Michael Schmidt and Francis Bitoni crafted a dress out of 3D-printed nylon mesh, as did Iris van Herpen .



The Extinct Mastodon

Here comes *Jurassic Park* in real life: Researchers at the University of Michigan 3D Lab managed to print accurate replicas of mastodon bones this year—120 centuries after the beast went extinct. The plaster models open the door for new learning on this prehistoric creature, possibly replacing more traditional, less precise replicas as seen here.

Edible Meat

Where's the beef? In your computer, perhaps. Much has been invested in U.S. start-up Modern Meadow in pursuit of 3D printers that can produce meat from animal cells and other materials like amino acids, potentially displacing traditional steaks like the one to the left. This could reduce the environmental impact of livestock and muddy the rules of kosher foodstuffs: If your pulled pork was never actually on a pig—well, you can consider the implications for yourself.

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HOW 3-D PRINTING WORKS

1 PLASTIC FEED
A spool of plastic filament—the printing material—unwinds and feeds into the top of the machine.

2 PRINTER HEAD
The plastic is heated, and a thin thread is squeezed out through a nozzle.

3 FINAL PRODUCT
An object is printed from the bottom up. The moving printer head lays down layers of melted plastic shaped as cross-sections of the object.

①

②

③

How 3-D Printing WorksThe process turns conventional manufacturing on its head, producing objects from the bottom up

People have traditionally made things—from doorknobs to scalpels to engine cylinders—in one of two ways. They start with a solid block or sheet of metal, wood or other material and cut, stamp, drill or shave it to create a desired shape. Or they use a mold made of metal or sand, pour liquefied plastic or metal into it and let it cool to create a metal casting or molded plastic part.

Now for something completely different.

Three-dimensional printing and other forms of what is known as additive manufacturing use neither machining nor molds. They build an object from the bottom up by piling razor-thin layers of material on top of each other until a three-dimensional shape emerges. The computer-guided technologies enables individuals to create objects, particularly prototypes, without a shop full of metal presses, cutting lathes or plastic injection molds.

There are a variety of processes for 3-D printing. Some of the most widely used rely on a printer that makes objects from powdered material. A 3-D printer bears little resemblance to a document printer in an office. It has two major parts: a "build box" that contains a smooth, thin bed of finely ground material such as pulverized stainless steel or powdered plastic, and a printing head. Depending on the type of printer, the head contains either a heat source, such as a laser or an electron beam, that melts the powdered material or jets that spray binder over the powder in a precise pattern. The binder functions as a glue for the material as an object is built.

The world-wide market for 3-D printing, which includes materials, machines and service, totaled \$2.2 billion last year, up 29% from 2011, according to industry estimates. But the process has some limitations. For high-volume jobs, 3-D printing can't yet match the speed and efficiency of traditional fabrication methods and machinery. Not all materials are suitable for powder-based additive manufacturing, and not all objects, particularly those made of metal, are able to stand up to high-stress use. For manufacturers of 3-D equipment, the future of their nascent industry depends on broadening the appeal of their equipment by expanding its uses and versatility.

—Bob Tita

From:

Sedita, J. (2013). *Keys to Content Writing*.
Rowley, MA: Keys to Literacy

Examples of *Sets of Steps*

How to Write a Summary

1. Read the material and identify the main ideas. Distinguish the main ideas from the details.
2. Write the main ideas in phrase form.
3. Begin the summary with an introductory statement.
4. Turn the main ideas into sentences, occasionally including details when it is necessary to convey the main idea.
5. Combine sentences into one or more paragraphs.
6. Use transition words to connect the sentences and the paragraphs.
7. Proofread the summary for punctuation, spelling, sentence structure, and content.

How to Write an Information Piece

1. Review the assignment requirements.
2. Identify print or digital sources.
3. Gather information from sources into two-column notes.
4. Organize notes into a writing plan.
 - chunk information and identify sub-topics
 - determine overall structure of the piece
 - introduction and conclusion decisions
 - paragraph and section decisions
 - develop a topic web to reflect writing plan
5. Write a draft.
 - write an introduction
 - write the body
 - write a conclusion
 - include transitions
 - add citations
6. Revise and edit the draft.

How to Write an Argument Piece

1. Identify the topic and review the sources.
2. Identify your claim.
3. Gather evidence from sources that supports your claim. Use two-column notes.
4. Review the evidence to generate reasons that support your claim.
5. If required, generate a counterclaim and take notes of ideas for a rebuttal.
6. Organize notes into a writing plan.
 - determine the order of the reasons you will present
 - if required, determine where you will present the counterclaim and rebuttal
 - include an introduction and conclusion in the plan
 - develop a topic web to reflect the writing plan
7. Write a draft.
 - write an introduction
 - write the body
 - write a paragraph for each reason that includes supporting evidence
 - write a paragraph that states the counter-claim and presents a rebuttal
 - write a conclusion
 - include transitions
 - add citations
8. Revise and edit the draft.

Writing a Research Report: Grades 4 - 5

1. What is your topic?
 - Get help from your teacher to pick your topic.
 - Make sure your topic is not too big.
2. Identify sources and collect information.
 - What do you already know about the topic?
 - Is there someone you can talk to who knows something about the topic?
 - Ask your teacher to help you find print and digital sources about the topic.
 - Read the print source(s) and/or watch the video(s) to find information about your topic.
 - Use two-column notes to write down important information.
 - Write main ideas in the left column, details in the right column.
3. Use a top-down topic web to plan the order of the main ideas about your topic.
4. Write a rough draft.
 - Start with an introductory sentence or paragraph that tells your topic and says one or two things about the topic.
 - Follow the order of topics on your topic web.
 - Use the information from your two-column notes to write sentences and paragraphs.
 - Write a paragraph for every main idea in the left column.
 - Start each paragraph with a topic sentence that states the main idea.
 - Use the details from the right column to write your supporting sentences.
 - If your report is more than 6 paragraphs, group the paragraphs into sections and write a heading for each section.
 - Use transition words and phrases.
 - End with a concluding sentence or paragraph that restates your topic and says something about the information in your report.
5. Review the draft
 - Follow a checklist to review your draft.
 - Be sure your ideas make sense, are complete, and are organized.
 - Check your draft for spelling, capitalization, and punctuation.
 - Ask someone else to review the draft.
6. Write a final draft
 - Fix your draft.
 - Add a list of your sources.
 - Develop a topic web to reflect the writing plan.

Writing a Research Report: Grades 6 - 12

1. Create a time line for your project.
 - Use a calendar to mark deadlines.
 - Carefully plan how much time you will need to complete each step.
2. Choose your topic.
 - Learn something about the topic to help narrow it down.
 - Read something short or talk to someone familiar with the topic.
 - Be sure there is enough information available to support your topic.
 - Write a draft title and introduction that includes the topic and purpose of your report.
3. Identify sources and collect information.
 - Locate print and digital sources, identify experts to interview.
 - Skim the texts and preview videos to find relevant information.
 - Take two-column notes.
 - Write main ideas in the left column, details in the right column.
 - Use quotation marks to track direct quotes.
 - Keep track of sources and page numbers.
4. Plan the overall organization of your report using a top-down topic web.
 - Organize the information from the notes into major topics and sub-topics.
 - Decide on the best order to present the topics.
 - Use the top-down topic web to show the plan for writing the report.
5. Write a rough draft.
 - Following the order of topics and sub-topics on your topic web, write sentences and paragraphs about the information from your notes.
 - Follow good paragraph structure as you write about the information.
 - Include a topic sentence that states the main idea.
 - Be sure all the sentences support the main idea.
 - Group the paragraphs into sections and add section headings.
 - Use transition words and phrases to make connections between sentences and among paragraphs.
 - Continue to track your sources.
 - Revise the draft title and introduction.
 - Add a conclusion
6. Review the draft.
 - Review for content.
 - Review for mechanics.

- Use a checklist as a reminder of what to review.
- Ask someone else to review the draft.

7. Write a final draft.

- Make changes based on your review and feedback from others.
- Develop a bibliography to formally cite sources.

How to Write An Overview of a News Article

1. Start with an introduction that includes this information: article, title, author, publication date.
2. Write 1 to 3 sentences about each of the following:
 - *Who or what is the article about?*
 - *What did the who/what do, OR what happened to the who/what?*
 - *When?*
 - *Where?*
 - *How?*
 - *Why?*
3. Conclude with a personal reaction to the article or make a connection to another news article you recently read.
4. Use transition words or phrases.

Information Writing Template

1. Write the introduction.

State the topic: _____

List some of the ideas presented in the body: _____

2. Write the body of the piece.

Paragraph 1

Topic Sentence: _____

Supporting sentences: _____

Paragraph 2

Topic Sentence: _____

Supporting sentences: _____

3. Write the conclusion.

Restate the topic: _____

Refer to the information presented: _____

4. Use transition words and phrases.

*also, another, as a result, because, besides, finally, first, for example
in addition, in conclusion, most importantly, such as, that is why, to sum up*

Opinion Writing Template

1. Introduce your claim (the position you are taking).

State your claim: (do not start with "I think...") _____

2. Determine the reasons and evidence to support your claim.

Reason	Evidence (examples, facts, statistics, expert opinion)
1.	
2.	
3.	

3. Provide a conclusion that restates your claim.

Restate your claim:

Summarize your reasons:

4. Include transitions:

also, for example, in fact, likewise, most important, although, because

Friendly Opinion Letter Template

Return address line 1
Return address line 2
Date (Month & Day, Year)

Dear (Name)

Introductory statement (state claim) _____

Body paragraph 1 (reason 1 & evidence) _____

Body paragraph 2 (reason 2 & evidence) _____

Concluding statement (restate claim, summarize reasons) _____

Closing (Sincerely),

Signature

Argument Writing Template

1. Introduce your claim (the position you are taking).

State the claim: _____

State the alternate or opposing claim: _____

2. Present the reasons and evidence to support your claim.

(you will use the evidence to explain how each reason supports your claim.)

Reason	Evidence (examples, facts, statistics, expert opinion)
1.	
2.	
3.	
4.	

3. Give a counter-claim and a rebuttal.

Counterclaim	Rebuttal

4. Provide a conclusion.

Restate the claim: _____

Summarize your reasons: _____

Include Transitions.

above all, also, although, another, because, by comparison, first, for example, for instance, for that reason, furthermore, however, in addition, in conclusion, in contrast, in fact, in short, to sum up, lastly, likewise, most important, second, similarly, that is why, therefore, to illustrate, unlike, without a doubt