

Interdisciplinary Unit Design

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University of Calgary

Education 520-12

APA 6th

Due: October 28, 2016

Grade 11 Social Studies, Science, Mathematics, & Art
 “Shermer High School” from *the Breakfast Club*
 Class size: 30

Topic:	Ethical Citizenship and Economics in the Olympics	
Date:	4 Week Plan	
Enduring Understanding/Big Concepts:	<p>Multicultural perspectives make up national identity</p> <p>Science can be used to balance the needs of society with sustainable ecosystems</p> <p>Understand relationships and make inferences through graphical algebraic reasoning</p> <p>Create compelling images as a form of expression</p>	
Critical/Essential Question:	How viable is it for Calgary to host the 2026 Winter Olympics?	
Objectives:	<p>By the end of this unit, students will,</p> <ul style="list-style-type: none"> ● Students will consider and appreciate the diverse make up on Canada’s national identity ● Students will be able to understand and assess the environmental and economic consequences of human action ● Students will form an understanding of linear and quadratic functions in terms of economic impacts ● Students will create compelling images that communicate with their viewers both visually and conceptually 	

<p>POS Outcomes:</p>	<p>See PDF links</p>	
<p>Assessment:</p>	<p>In groups of 4-5, students will organize a campaign to argue for or against the viability of Calgary to host the 2026 Winter Olympics.</p>	<p>A final showcase would involve a panel of judges including teachers from all 4 disciplines and experts who have been invited in the unit, to evaluate each group's presentation based on criteria.</p> <p>Experts will act as oral feedback while actual grading will be done by the 4 disciplinary teachers. In addition, a final class voting will occur to see which group had the most convincing presentation, and what the final class opinion is regarding the bid.</p>
<p>Assessment Criteria:</p>	<p>Rubric for final showcase will be developed with the input of students, but under the direction of teachers. Each of the 4 subject areas will be represented in the rubric, translating to a portion of the final grade in that subject as determined by each teacher.</p> <p>Students will include the costs and benefits related to the economic and environmental factors studied to help justify their position.</p>	<p>Oral/Visual Media presentation (group summative), written essay (individual summative).</p>

	<p>To promote their position, students will create an artifact (printed t-shirt) that reflects the multiple perspectives within their position.</p> <p>Students will also describe how they plan on spreading awareness of their campaign to the relevant parties regarding their position.</p>	<p>Artifact presentation/explanation (group summative), written rationale (individual summative)</p> <p>Oral/Visual Media presentation (group summative)</p>
<p>Learning Sequence:</p>	<p style="text-align: center;">Week 1</p> <p>Social Studies Guiding Question: To what extent should the Olympics be a place to push political agendas?</p> <p>Students are given the provocation followed by a discussion on why a country/city might want to host the Olympics and what benefit does the Olympics have in modern day. Students are then given the 4week task sheet with the critical question and explained their group interdisciplinary task for the next 4 weeks. In this week, students will understand the concept of nationalism. In addition, a local Olympic athlete would be invited to talk to them in one class about the meaning of the Olympics from the perspective of the athlete.</p> <p>Task</p> <ul style="list-style-type: none"> ● Inquiry into the historical meaning of the Olympics, each group given one topic to present on - history (ancient and modern), symbols (meaning and controversy), women in the Olympics, Berlin Olympics, Black salute, other controversies. ● Using historical thinking lens (what does it say about the time, how is it different now?). Leading into a discussion on 	<p>Provocation: https://www.youtube.com/watch?v=ISTPIAYOsAc</p> <p>Connection to experts</p> <p>SS Specific outcomes S.2, 1.1, 1.4, 1.5, 1.8, 4.1</p> <p>Students work with technologies (computer, internet) for research</p>

	<p style="text-align: center;">nationalism, expression of nationalism, how national identities are shaped, as a lens for viewing the Olympics.</p> <p>Science Guiding Question: How do humans impact the environment? How might the human impact on the local environment change during the Olympics?</p> <p>Understand the significance of habitat destruction on an ecosystem. Understand how human intervention effects the environment.</p> <p>Tasks</p> <ul style="list-style-type: none"> ● Students will be tasked with researching, in their groups, some of the human activities that affect the environment and ecosystems most heavily, and which of these activities may increase during the olympics ● Students will be guided to consider local industries, specifically cement production in Exshaw ● An expert from lafarge (http://www.lafarge-na.com/wps/portal/na/en/Exshaw/6_3-Community_Support_Guidelines) will be brought into the classroom to discuss the manufacturing process and associated environmental concerns, if possible s/he will also provide students with data (or where to find it) on carbon emissions, reduction technologies, and other reclamation and reduction efforts 	<p>20-D1.4K, SS S.3, SS S.7, Use of technology for research Connect to experts 20-D2.1K, 20-D1.2S</p>
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	<ul style="list-style-type: none"> ● Students will compile what they feel is the most important information that may serve as evidence to their greater investigation into the olympics ● Guided class discussion/debate will serve as a means to ensure all students in agreement on key concepts such as habitat destruction, reclamation, and the use of hydrocarbons in cement production. <p>Mathematics Guiding Question: What types of relationships/patterns exist in data collected regarding the Olympics?</p> <p>Understand the purpose of using quadratic functions to better relate variables than a linear function can.</p> <p>Task</p> <ul style="list-style-type: none"> ● Provide students with an entry slip and ask them to graph the table of values provided. Discuss their findings, what kind of relationship exists - this will be linear to help students recall prior learning. ● Through group discussions get students to think of situations where a linear relationship would not be appropriate. ● Activity: Graph throwing of tennis balls, what pattern do you find? ● Introduce functions of graphing calculator, how to insert table of values and the resulting graph. 	<p>Outcome 2</p> <p>Technology</p>
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	<p>as: “Aside from aesthetic choices, what other choices did the artist/designer make that further communicated or enhanced their statement?” “What do you think that statement is?” “Would you have changed anything about the design and why?”</p> <ul style="list-style-type: none"> ● Briefly address the environmental and economical pros and cons that students are already discussing in their Science and Math classes. Let students know that they will be basing one of their own designs off of their knowledge and thoughts derived from the two disciplines. ● Teacher will also lead the discussions toward symbolisms and cultural identities to make way for what is to come in Social Studies during Week 2. ● Teacher will mention on the last class that there will be an Indigenous guest artist the following week, with whom the students may wish to collaborate on their designs. ● Throughout the week, students will start their research on various symbolisms, especially ones that gear toward Canada/Calgary and their own ethnic backgrounds. They should have their list of findings (and if possible, one initial design) completed at the beginning of Week 2. <p style="text-align: center;">Week 2</p> <p>Social Studies Guiding Question: What are the various perspectives and cultural identities in Calgary and Canada?</p> <p>After seeing the Olympics as a space that propagates political agendas, students will now consider the multiple perspectives that make up their</p>	<p>COMPOSITIONS - Relationships 2 ENCOUNTERS - Sources of Images</p> <p>Resources http://www.familytreesandcrests.com/heraldry-symbols.htm http://www.fleurdelis.com/symbolism.htm</p>
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	<p>nation and city’s identity, and how these identities may or may not be reflected in the Olympic issue.</p> <p>Task</p> <ul style="list-style-type: none"> • Students will analyze traditional symbols of Canada and Calgary and consider the messages and meaning of whose perspectives are reflected and whose are left out. Specific attention to FNMI and Francophone perspectives will be given, what might they say about the Olympic issue? • Students will then design and create a proposal of what an all inclusive symbol could be to represent the multiple perspectives for Calgary Olympics 2026. An online blog would be created to post their designs along with a written rationale <p>Science Guiding Question: What are the consequences of technology and society for the environment and for humans? Consider the Exshaw cement plant, how can negative environmental consequences be mitigated?</p> <p>Introduce externalities to tie to Social Studies Understand that our environment plays a role in National Identity, taking into consideration the perspective of indigenous communities. Begin to understand both the intended and unintended consequences for humans and the environment associated with technology and society. Understand the carbon cycle and its significance to society and technology.</p> <p>Task</p>	<p>SS Specific outcomes 4.1, 4.2, 4.3, 4.4, 4.9</p> <p>Returning back to the community</p>
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	<ul style="list-style-type: none"> ● Groups will be tasked with determining and providing examples of the importance to concrete in everyday life, and in the context on an Olympic games ● Students will be challenged to draw in concepts from social studies to analyze the role of our environment (geography) in our national identity. Class discussion/Debate will center on what extent scientific fact matches or informs national identity. Students will be challenged to consider the role Indigenous Canadians have as stakeholders in any industrial development on treaty 7 land. ● Each group will be tasked with presenting their research into the use/necessity of habitat reclamation in the bow valley. ● Inquire into the extent industries in Alberta, specifically cement production, effect the carbon cycle and our local environment. ● Analyze the combustion of coal through chemical equations and use molar mass to determine mass of CO₂ emitted per mass of Coal burned. (This will be scaffolded by the teacher during class and submitted as a summative piece of assessment) <p>Mathematics Guiding Question: What are some methods that will help us solve nonlinear problems?</p> <p>Understand various methods to solve quadratic functions. Further learning by making connections between absolute functions and inequalities. Students will begin to create graphs using Excel.</p> <p>Tasks</p>	<p>SS Specific outcomes S.3, 2.1, 2.2, 2.3</p> <p>SS Specific outcome 1.8</p> <p>Sci 20-D2.4s</p> <p>Sci 20-D.2.4S</p> <p>Sci 20-A3.5K</p> <p>Outcomes 1, 8</p> <p>Technology</p>
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	<ul style="list-style-type: none"> ● Solve previous week’s linear and quadratic relationships through factoring, difference of squares, decomposition and perfect square trinomials ● Inquire into how inequalities can be utilized to show similar findings of an absolute function ● Determine which functions from the previous week should be solved as an inequality ● Introduce Excel and how this is similar to graphing calculator <p>Art Guiding Question: What would an all inclusive Olympic symbol for Calgary look like?</p> <p>Building upon the critique of national symbols that often only reflect the dominant perspectives, students will now consider the multiple perspectives that make up their nation and community.</p> <p>Task</p> <ul style="list-style-type: none"> ● Drawing from various nationalistic identities and perspectives (as discussed in Social Studies), students will continue their research on cultural symbolisms and come up with two separate designs of their own: <ul style="list-style-type: none"> ● The first design should show the student’s stance on the environmental v.s. economical debate in regards to hosting the Olympics in Calgary (5 - 10 paper editions, and 2 - 3 t-shirt/canvas bag editions). 	<p>DRAWINGS - Investigate</p> <p>DRAWINGS - Communicate</p> <p>DRAWINGS - Articulate and Evaluate</p> <p>COMPOSITIONS - Relationships 2</p>
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	<ul style="list-style-type: none"> ● The second design should be more personal and relate to the student’s own ethnic and/or cultural identity (5 paper editions, and 1 optional t-shirt/canvas bag edition). ● Teacher will allot time during the first half of every class to demonstrate the procedures involved in woodblock printing. Teacher should also mention that the students will be showcasing their end products following Week 4. ● A local Indigenous artist will be invited to introduce the students to First Nations art styles, mediums, symbolisms, inspirations, and so forth. Students who wish to include Aboriginal elements in their designs will work under the guidance of the Indigenous artist throughout the week. ● Students should have their research notes, list of symbols, and final designs completed by the end of the week. Each student is expected to discuss the concepts behind their designs with the teacher. Woodblocks and tools will not be provided until the teacher has approved a student’s sketches. ● Students will make use of the same online blog created in Social Studies to share their two designs with the rest of the class. <p style="text-align: center;">Week 3</p> <p>Social Studies Guiding Question: Who and how do we approach in our democracy to voice our opinions on a public issue? What are the best ways to bring about change?</p> <p>After considering multiple perspectives regarding the Olympic issue, and through an emerging analysis of the environmental and economical issues from Science and Mathematics, students will begin to form</p>	<p>COMPOSITIONS - Organization</p> <p>ENCOUNTERS - Sources of Images</p> <p>SS Specific outcome 4.9</p> <p>Connection to experts</p> <p>Returning back to the community</p>
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	<p>opinions, and must now inquire into how they can exercise their democratic rights as citizens to voice such opinions. A local Councilor or representative from the City Council’s office can be brought in as an expert to describe local political structure.</p> <p>Task</p> <ul style="list-style-type: none"> ● Inquiry into the Olympic decision system, how countries bid to host, who and how to lobby and voice public opinion to influence that decision. These become the first steps in drafting out their final assessment - the campaign method ● At the same time, teacher led discussion, returning to concept touched on in Science, about nations pursuing national interests - Does it always have public support, what consequences arise from pursuing national interests, who decides? <p>Science Guiding Question: How does the production of cement in Alberta influence the carbon cycle and the environment?</p> <p>Students will build a holistic, evidence based view of relationship between society, technology and the environment. Using logical reasoning students will begin to form and share opinions as to whether the environmental consequences of cement production can justify the economic consequences in the context of hosting the Olympics.</p> <p>Task</p> <ul style="list-style-type: none"> ● Students will utilize values of CO2 emissions per mass of cement produced in conjunction with a the <i>unit price of cement vs mass of cement produced</i> relationship determined in math to determine a range of values for the projected total CO2 emissions 	<p>Connection to experts</p> <p>SS Specific outcomes S.6</p> <p>SS Specific outcomes 2.1, 2.2, 2.3</p>
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	<p>associated with the cement production needed for the 2026 olympics.</p> <ul style="list-style-type: none"> • Students will also bring in data from math related to the projected profits from the olympics games • In groups students will be challenged to consider these models and weigh the environmental effects vs the potential for financial gain through logical reasoning • Each group will be asked to create a brief presentation, utilizing some form of multimedia, which communicates their opinion and demonstrates the evidence and reasoning associated with their opinion. • Externalities will be introduced, and be taken into account during this process • Students will be given specific and actionable formative feedback on their presentation to help them prepare for their final showcase <p>Mathematics Guiding Question: What type of data can help us understand the economically efficient amount of supplies builders require to build new infrastructure for the Olympics.</p> <p>Students will create a quadratic function and find the minimizing points on the graph through standard notation.</p> <p>Task</p> <ul style="list-style-type: none"> • Invite business or data analytics member of Calgary Sport Tourism Authority to discuss importance of a Feasibility Study 	<p>Math - Specific Outcome 2,4,5</p> <p>Sci 20–A3.2sts,20–D2.2k</p> <p>Sci 20-A3.4k, 20–D2.4s</p> <p>20–D2.1sts,20–A3.1sts</p> <p>SS 2.2, SS 2.3, S.7, S.3</p> <p>Sci 20–A3.1sts</p> <p>Sci 20–D1.2sts</p> <p>Outcomes 3, 5</p>
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	<p>before submitting an Olympic Bid. What kind of variables are they interested in and what process do these numbers go through to provide an analysis.</p> <ul style="list-style-type: none"> ● Inquiry into which variable (data) information students will need to collect in order to help form arguments for a cost minimization problem. ● Students will create a cost minimization scenario for three conditions: high infrastructure, medium infrastructure and low infrastructure levels ● Determine characteristics of a quadratic function graph and communicate findings appropriately - how can the minimum of a graph help inform our decisions? <p>Art Guiding Question: Should Calgary host the 2026 Winter Olympic games?</p> <p>As students begin to form their opinions from facts drawn in both Science and Mathematics, groups will begin planning their campaign to lobby public opinion regarding the Olympic issue. Using ideas of perspectives and symbols from Social Studies, students will transfer their designs from the sketchbooks onto woodblocks.</p> <p>Task</p> <ul style="list-style-type: none"> ● Students are given the rest of the week as work time. The teacher will circulate around the classroom to troubleshoot and/or further explore the students' ideas. ● If needed (i.e. if students need refreshers or were absent during previous week's demo), teacher will go through the woodblock printing process again in a small group. 	<p>DRAWINGS - Record</p> <p>DRAWINGS - Investigate</p> <p>DRAWINGS - Communicate</p> <p>DRAWINGS - Articulate and Evaluate</p> <p>COMPOSITIONS - Components</p> <p>COMPOSITIONS - Organizations</p>
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	<p>on the biogeochemical cycles and assessing whether the efforts to reduce human impact on biogeochemical cycles are viable. Using appropriate multimedia platforms to contribute to their final showcase project.</p> <p>Task</p> <ul style="list-style-type: none"> ● Allow students inquire into the modern carbon emissions reduction technologies/methods, with a focus on those employed by Lafarge in Exshaw ● Through teacher guided discussion and debate students will determine scientifically accepted value(s) of CO2 reduction associated with a number of these technologies ● Students will be tasked with reevaluating the models created in week 3, and therefore reconsider the environmental and economic balance of industry and the Olympics ● Students will be reminded of treaty 7 and the FNMI issues associated with industry, and will be asked if these technologies relate to these issues and how. ● Students will be given time to prep for final showcase <p>Mathematics Guiding Question: What type of revenue stream will the infrastructure require to be economically beneficial?</p> <p>Students will find historical ticket prices of the Olympics to create a profit function. Using general notation they will find the maximum of the curves.</p> <ul style="list-style-type: none"> ● Students will inquire into which data is needed to create a profit maximizing function, how can a two variable system of equations be utilized to solve this problem? 	<p>Sci 20–A3.1sts, 20–A3.2sts, 20–D2.4s, 20–D1.2sts</p> <p>Sci 20–A3.2sts</p> <p>Math - Specific Outcome 2,4,5</p> <p>SS Specific outcomes S.2, 4.3</p> <p>Sci 20–D2.4s</p> <p>Outcomes 4, 7, 5, 6</p>
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	<ul style="list-style-type: none"> ● Gather historical ticket price and seating data on Olympic stadiums. ● Analyze this graph using inequalities for differing minimum amounts of seats. ● Determine characteristics of a quadratic function in standard notation. ● Using Excel graph data, interpret using general notation. Analyze data and make conclusions. ● Justify the cost and benefit data you have collected what does this mean? What changes could have been made to improve your findings? <p>Art Guiding Question: What are the important considerations regarding Calgary’s viability to host the 2026 Winter Olympics?</p> <p>Students continue to work on their artifact under the guidance of the teacher. Self assessment/critique as they go along to consider how they might improve given more time or technologies?</p> <p>Task</p> <ul style="list-style-type: none"> ● As a continuation of the previous week, students are given class time to wrap up their prints. Should a student have finished the Art portion of the project, they will also be free to work on their writings and analysis for the other disciplines (or vice versa). ● A group critique of the finished prints will take place on the second last class of the week. Students are expected to verbally communicate the thoughts behind their visual designs, from their chosen imageries to the colour schemes they decided upon. 	<p>DRAWINGS - Record</p> <p>DRAWINGS - Investigate</p> <p>DRAWINGS - Communicate</p> <p>DRAWINGS - Articulate and Evaluate</p> <p>COMPOSITIONS - Components</p> <p>COMPOSITIONS - Relationships 2</p> <p>COMPOSITIONS - Organizations</p>
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	<ul style="list-style-type: none"> • During the final class of the week, students and teacher(s) will set up the space used for their upcoming debate. • Each student will write a ½ page artist statement that concisely communicates the thoughts behind their design, and/or any challenges they may have faced throughout their creative process. 	<p>ENCOUNTERS - Sources of Images</p> <p>ENCOUNTERS - Impact of Images</p>
<p>Formative Feedback</p>	<p style="text-align: center;">Social Studies</p> <p>Week 1 During inquiry, teacher is constantly listening in on discussion and observing each group’s research process. Checking in and providing provoking questions for students to dig deeper into their topic.</p> <p>Week 2 Teacher continues to scaffold students’ understanding of the Canadian/Calgarian perspectives as presented, and poses critical questions to dig deep into those left behind. In addition, teacher provides feedback through group conferences regarding their design for Art and questions the perspectives their bringing or intentionally leaving out.</p> <p>Week 3 Multiple conferences with groups to check in on campaign plan and design (for Art), using the nationalism/identity lens to critique and provide feedback. In the middle of the week, students will also fill out an exit response slip indicating what they have learned so far, and what else are they curious about to inform additional teaching for the last week.</p> <p>Week 4 Teacher does group conferences daily to mark progress and check for group dynamics and individual contribution to the task. In addition, teacher will do an individual feedback check on each student’s written</p>	

	<p>outline midweek and provide feedback regarding synthesizing their arguments.</p> <p style="text-align: center;">Science</p> <p>Week 1 Teacher guided discussion to establish current knowledge level and identify misconceptions of content. Access to Expert to help address misconceptions.</p> <p>Week 2 Teacher guided discussion. Peer assessment within and between small groups.</p> <p>Week 3 Teacher guided discussion. Peer assessment within and between small groups. Specific and actionable feedback on research process and calculations/conclusions.</p> <p>Week 4 Teacher guided discussion. Peer assessment within and between small groups. Specific and actionable feedback on research process and calculations/conclusions and presentation methods.</p> <p style="text-align: center;">Mathematics</p> <p>Week 1 Entry slip of drawn graphs and interpretations, what patterns did students find.</p> <p>Week 2</p>	
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	<p>Excel findings and exit slip requiring students to solve a function using factoring.</p> <p>Week 3 Excel graphs and group discussions on which cost data is needed.</p> <p>Week 4 Individual discussions of student experience and their level of understanding types of functions.</p> <p style="text-align: center;">Art</p> <p>Week 1 Student participation during initial critique (teacher will make sure that everyone in the class has vocalized their thoughts).</p> <p>Week 2 Research notes in student sketchbooks, and participation in the online blog created for their designs in both Art and Social Studies. Students should also either have taken notes during the printing demos, or taped the step-by-step instructions to a page in their sketchbooks.</p> <p>Week 3 One-on-one communication/reflection/critique with individual students during class time.</p> <p>Week 4 Final group critique.</p>	
<p>Differentiation Strategies:</p>	<p>Multi-modal expression of knowledge</p> <ul style="list-style-type: none"> ● Oral presentation of findings, visual/artistic expression of artefact, written essay/rational 	<p>UDL</p>

	<ul style="list-style-type: none"> ● Combination of group and individual summative assessment to assess both cohort and independent knowledge <p>Essay/Rationale graphic organizer given for ELL students to help synthesize/arrange their arguments for individual written portion</p> <p>In Science - Break class into groups (5ish people) with distinct roles, allow for peer and self assessment.</p> <ul style="list-style-type: none"> ● Roles will vary from very technical data analysis and manipulation to less technical writing, summation of findings, presentation creation. Presentations will be of any format (within reason) ● Allow students to take on a role within in their group that best suit their abilities ● Students seeking more challenge will be allowed to go further in depth than other groups into research of concepts and associated concepts ● Students struggling will be provided more small group and one on one time with teacher <p>Math – Graphing real life scenario (kinesthetic), video representation, individual findings and group discussions, interviews, open ended challenges</p> <p>Art Accommodations</p> <ul style="list-style-type: none"> ● ELL: 	
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	<ul style="list-style-type: none"> ● Rather than a fully developed written reflection, ELL students could choose to reflect through small comic strips, with or without speech bubbles. ● Students may also choose to communicate their reflection verbally with the teacher (the teacher might wish to record the conversation as reference for later on?). ● ADHD: <ul style="list-style-type: none"> ● A student with this particular type of learning disability will be allowed to walk around the classroom during any time, provided that they do not verbally distract other students. ● Assign another student to keep an eye on the ADHD student. ● The teacher may offer to ‘bring’ this student with them as the teacher circulates the classroom to help other students develop their ideas. ● Allergic reactions to materials: <ul style="list-style-type: none"> ● Students are provided with gloves and masks during the creating process. However, in the event that a student is allergic to the materials used in class (the wood type, the ink, etc.), other forms of media will be given as accommodation (i.e. using another type of wood/ink). 	
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