21CLD Learning Activity Rubrics

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21st Century Learning Design Rubrics

Introduction

Educators globally are working to design new models of learning that better prepare learners for life and work in the 21st Century. The purpose of the 21st Century Learning Design rubrics is to help educators identify and understand the opportunities that learning activities give students to build 21st century skills. These rubrics were developed and tested internationally for the Innovative Teaching and Learning Research project.

A **learning activity** is any task that students do as part of their school-related work. It can be an exercise that students complete in one class period, or an extended project that takes place both in and outside of school.

This guide describes **six rubrics of 21st century learning**, each of which represents an important skill for students for develop:

- collaboration
- knowledge construction
- self-regulation
- real-world problem-solving and innovation
- the use of ICT for learning
- skilled communication

In this guide, the description of each rubric has three parts:

- an **overview** of definitions of key concepts and related examples;
- a **rubric** to help you assign each learning activity a number from 1 to 4,* according to how strongly it offers opportunities to develop a given skill;
- and a **flowchart** that shows how to choose the best number in each case.

*In some cases the numbers from 1 to 5 are used, with 5 representing an additional, higher goal.

Collaboration

Are students required to share responsibility and make substantive decisions with other people? Is their work interdependent?

Overview

In traditional schooling in most countries, students do their own work and receive their own grades. This model does not prepare them well for the workplace, where they are likely to work on teams with others to accomplish tasks that are too complex for individuals to do on their own. In today's interconnected world of business, real project work often requires collaboration across companies (e.g., a collaboration between a pharmaceutical company and a chemical engineering company to produce a new vaccine) or with people in a different part of the world. This type of working requires strong collaboration skills to work productively on a team and to integrate individual expertise and ideas into a coherent solution.

This rubric examines whether students are **working with others** on the learning activity, and the quality of that collaboration.

At higher levels of the rubric students have **shared responsibility** for their work, and the learning activity is designed in a way that requires students to **make substantive decisions together**. These features help students learn the important collaboration skills of negotiation, conflict resolution, agreement on what must be done, distribution of tasks, listening to the ideas of others, and integration of ideas into a coherent whole. The strongest learning activities are designed so that student work is interdependent, requiring all students to contribute in order for the team to succeed.

Big Ideas

Students **work together** when the activity requires them to work in **pairs or groups** to:

- discuss an issue
- solve a problem
- create a product

Students work in pairs or groups might also include people from outside the classroom, such as students in other classes or schools, or community members or experts. Students can work together face to face or by using technology to share ideas or resources.

IS THIS WORKING TOGETHER?	
YES:	**NO:**
Pairs of students give each other feedback.	Students do their work alone.
A small group discusses an issue together.	A whole class discusses an issue.
A student uses Microsoft Lync or Skype to interview a student in another town via the Internet.	
Students use OneNote to share their story drafts and give each other feedback.	Each student creates his/her own story and sends it to the educator for feedback.

Students have **shared responsibility** when they work in pairs or groups to develop a common product, design, or response. Shared responsibility is more than simply helping each other: students must collectively own the work and be mutually responsible for its outcome.

If the group work involves students or adults from outside the classroom, this qualifies as shared responsibility ONLY if the students and the outside participants are mutually responsible for the outcome of the work.

IS THIS SHARED RESPONSIBILITY?	
YES:	**NO:**
Students conduct a lab experiment together. Students have joint responsibility for carrying out the lab experiment.	**Students give each other feedback**. This activity structure implies that one student "owns" the work, and the other is only helping.
A student works with a peer in another country to develop a joint website using Microsoft Office 365. The students share responsibility for the development of the website.	**A student interviews a peer in another country about the local weather**. This is a task that students conduct together, but they do not have mutual responsibility for its outcome.

Students make **substantive decisions together** when they must resolve important issues that will guide their work together. Substantive decisions are decisions that shape the content, process, OR product of students' work:

- **Content:** Students must use their knowledge of an issue to make a decision that affects the academic content of their work together, such as taking a stance on a topic they will then write about, or deciding on the hypothesis they will test.
- **Process:** Students must plan what they will do, when to do it, what tools they will use, or the roles and responsibilities of people on the team.
- **Product:** Students must make fundamental design decisions that affect the nature and usability of their product.

IS THIS A SUBSTANTIVE DECISION?	
YES:	**NO:**
Students in teams are preparing for a debate and must decide what side of the issue they will argue for. This is a content decision that will shape their work together, and students must negotiate their ideas.	**Students work together to identify capital cities of particular countries in Europe**. This decision does not affect the rest of their work.
Pairs of students are developing a presentation about climate change and must decide what causes to write about. Students must decide together what the most important causes are; this decision will shape their presentation.	**Pairs of students choose which animal they will study**. Students will probably make this decision based only on personal preference, not on their knowledge of the subject.
Student teams are conducting a research project and must decide on their own workplan and roles on the team. Students must plan the process of their work.	**Student teams assign roles to team members based on the list of roles the educator has defined.** The educator has planned the process of their work, not the students.
Pairs of students decide how to shape their presentation to a particular audience. This is a fundamental design decision that will affect the nature of their overall product.	**Pairs of students select a colour scheme for their presentation.** Decisions about surface features are not considered substantive decisions that fundamentally affect product design.

Students' work is **interdependent** when all students must participate in order for the team to succeed. Too often, a group of students may share responsibility for an outcome, but in practice the work is not divided fairly: one or two students may do all the work for the team. The strongest learning activities on this rubric are structured to require the participation of all students.

To meet this criterion, students must be required to produce an **interdependent product** (such as a presentation that they each must share in developing and presenting) or other **interdependent outcome** (such as a decision that requires information that is distributed across students).

Most interdependent work involves two levels of accountability:

- Individual accountability: each individual on the team is responsible for a task that he or she must complete in order for the group to do its work. The role of each student on the team is essential.
- Group accountability: the students must work together to produce the final product or outcome. Students must negotiate and agree on the process, design, and conclusions of their work.

It is important that the work is structured in a way that requires students to plan together and take the work of all team members into account so that their product or outcome is complete and fits together. For example, if each student is responsible for a page of a presentation, and in the final presentation the pages are simply assembled together, this is NOT considered interdependent. The final presentation IS considered interdependent if the students' contributions must work together to tell a story or communicate an overarching idea; in this case, students' individual pages must be designed as parts of a coherent whole.

IS STUDENTS' WORK INTERDEPENDENT?	
YES:	**NO:**
Group members each research a different internal system (e.g. circulation, digestion, etc.) of frogs. Students then work together to dissect a frog and write a lab report about the dissection, identifying frog parts and the systems to which they belong. Students rely on each other's work in order to successfully identify what they see during the dissection.	**Group members work together to research frogs, but each student conducts their own dissection and writes their own lab report.** Students work together on the research component, but the products do not require input or participation from others.
Students each use their own networked device to contribute coordinate points that must collectively create the shape of	**One student uses a device to plot coordinate points and create a star shape, with input from group**

a star. Each student's contribution is necessary so the group can create the completed shape.	**members.** Only one student is plotting coordinates; the others may contribute, but they could also disengage without preventing the group from completing the product.
Students create a tourist website presenting the history, culture, attractions, and accommodations of their local area. Each individual might create a different piece of the overall website, but students need to work together to determine how to organize the information to create the best possible website.	**Students each create a webpage about the history, culture, attractions, or accommodations of their local area that will be linked to the class homepage.** Students do not have to strategize together in any particular way.
Students use Mouse Mischief to create a diagram showing the food chain in a vernal pond ecosystem. Each student controls a particular species and students must work together to place each species in its appropriate niche in the food chain. Students must work with each other to complete a comprehensive and accurate representation of the food chain.	**Students use Mouse Mischief to identify which species in the vernal pond ecosystem are carnivores, herbivores, or omnivores, by placing each species in the appropriate list.** Any student can use their mouse to move any species to any list; students do not need to work together in any specific way.

Collaboration: Rubric

In this learning activity,

1

- Students are NOT required to work together in pairs or groups.

2

- Students DO **work together**
- BUT they DO NOT have shared responsibility.

3

- Students DO have **shared responsibility**
- BUT they ARE NOT required to make substantive decisions together.

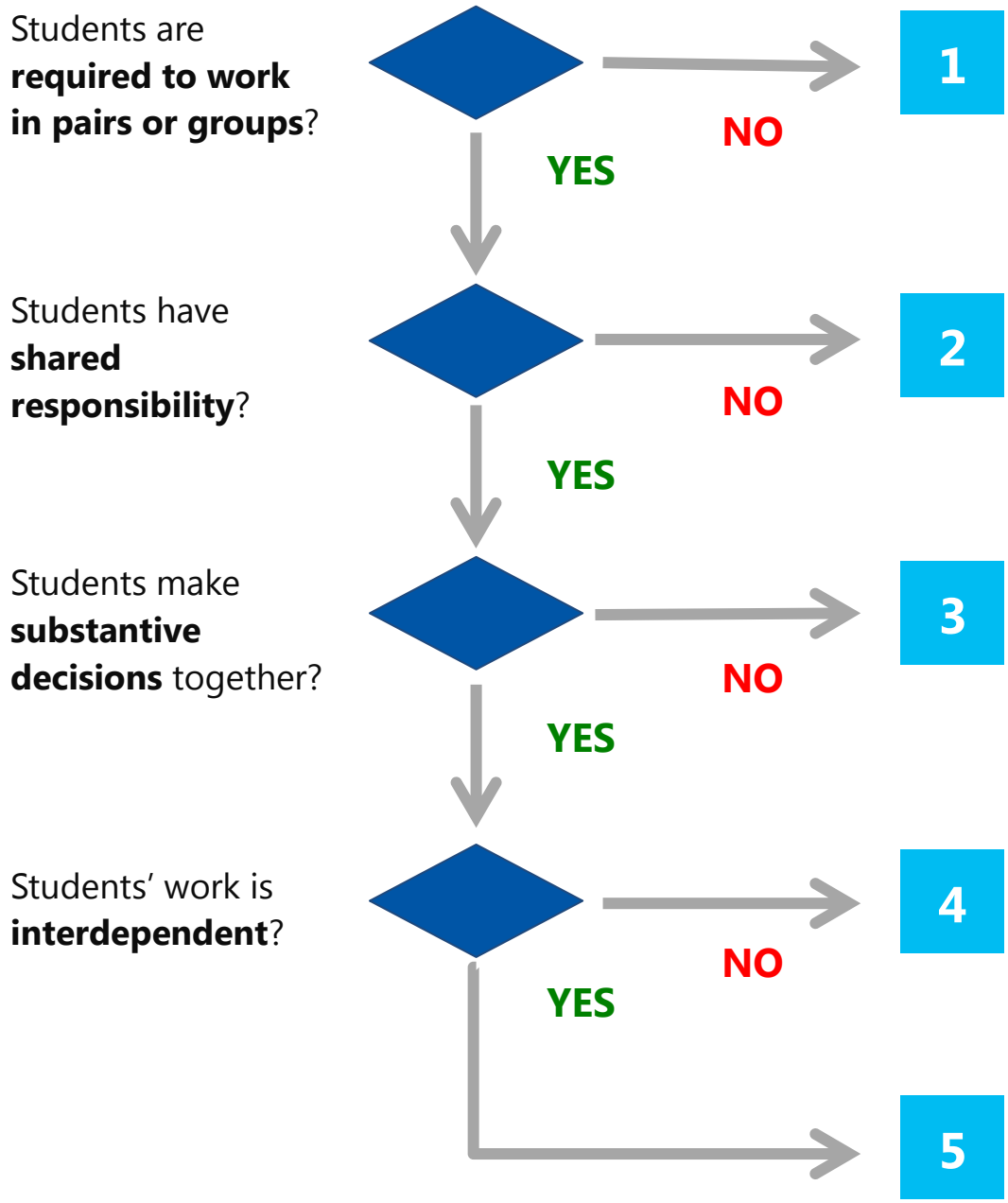
4

- Students DO have **shared responsibility**
- AND they DO make **substantive decisions** together about the content, process, or product of their work
- BUT their work is not interdependent.

5

- Students DO have **shared responsibility**
- AND they DO make **substantive decisions** together about the content, process, or product of their work
- AND their work is **interdependent.**

Collaboration: Decision Steps



Knowledge Construction

Are students required to construct and apply knowledge? Is that knowledge interdisciplinary?

Overview

Many school activities require students to learn and reproduce information they are given. Certainly it is essential for students to master the important content of a domain. But memorization alone does not give students the critical thinking and reasoning skills that they will need for success in higher academics and in knowledge-based organizations. With information so readily available through the Internet and other sources, employees must be able to integrate and evaluate information in order to use it productively in their work. Increasingly, most living-wage jobs also demand higher levels of expertise than in the past, and the ability to apply knowledge to new situations and new problems. This rubric looks at students' opportunities to build deep knowledge that they can transfer and apply in practice.

Knowledge construction activities require students to generate ideas and understandings that are *new to them*. Students can do this through **interpretation**, **analysis**, **synthesis**, or **evaluation**. In stronger activities, knowledge construction is the **main requirement** of the learning activity.

The strongest activities require students to **apply** the knowledge they constructed in a different context, helping them to deepen their understanding further, and to connect information and ideas from **two or more academic disciplines** (for example, integrating learning from both science and literature).

Big Ideas

Knowledge construction happens when students do more than reproduce what they have learned: they go beyond knowledge reproduction to generate ideas and understandings that are new to them. The skills of knowledge construction are often considered "critical thinking." Activities that require knowledge construction ask students to **interpret**, **analyse**, **synthesize**, or **evaluate** information or ideas.

- **Interpretation** means drawing inferences beyond the literal meaning. For example, students might read a description of a historical period and infer why people who lived then behaved the way they did.
- **Analysis** means identifying the parts of a whole and their relationships to each other. For example, students might investigate local environmental factors to determine which are most likely to affect migrating birds.
- **Synthesis** means identifying the relationships between two or more ideas. For example, students might be required to compare and contrast perspectives from multiple sources.
- **Evaluation** means judging the quality, credibility, or importance of data, ideas, or events. For example, students might read different accounts of an historical event and determine which ones they find most credible.

If an activity asks students to practice a procedure they already know, or if the activity gives students a set of steps to follow, the activity does NOT require knowledge construction. To determine whether students already know a certain procedure, consider what is typically expected of students of their age. If an activity asks students to devise a procedure themselves, the activity DOES require knowledge construction.

It is important to note that not all student activities that are commonly described as "research" involve knowledge construction. If students are asked to look up information and then write a paper that simply describes what they found, students are reproducing knowledge, but they ARE NOT constructing knowledge—they have not been asked to interpret, analyse, synthesize, or evaluate anything.

IS THIS KNOWLEDGE CONSTRUCTION?	
YES:	**NO:**
Students use details in a story to infer the reasons why a character committed a crime.	Students write a paper describing the crime a character committed.
Students use Bing to search the Internet for information about local activities to help the environment and analyse it to decide what else could be done.	Students use Bing to search the internet for information about local activities to help the environment and give a presentation to describe what they found.
Students write a paper that compares and contrasts information from multiple sources.	Students write a paper that describes information they found online or in books.
Students compare different explanations for changes in atmospheric pressure to determine which explanations are credible.	Students familiar with the barometer use one to measure atmospheric pressure.

Students who have not learned about parallel lines examine several different pairs of lines to try to develop a definition of "parallel".	Students who have already been taught the definition of "parallel" use the definition to decide whether several sets of lines are parallel.

The **main requirement** is the part of the activity that students spend the *most time and effort on* and the part that educators *focus on when grading*. If the learning activity does not specify how much time students should spend on each part, you may have to use your professional judgment to estimate how long students are likely to spend on different tasks.

IS KNOWLEDGE CONSTRUCTION THE ACTIVITY'S MAIN REQUIREMENT?	
YES:	**NO:**
Students spend 10 minutes listing details from a story, then spend 35 minutes using the details to propose why a character committed a crime.	Students spend 35 minutes listing details from a story, then in the last 10 minutes of class they use the details to infer why a character committed a crime.
Students earn 30% of their grade for finding information and 70% for analysing what they find.	Students earn 70% of their grade for finding information and 30% for analysing what they find.

Students must **apply their knowledge** when they use the knowledge they have constructed to support another knowledge construction task in a new context. For example, students in a physics class might construct knowledge about heat principles from a study of the Earth's inner core, and then apply what they learned to investigate the environment of Jupiter. Students in language class might write a persuasive essay for an academic audience and then apply the knowledge they constructed about audience-focused writing to reposition the same content for a public newspaper article. In each case, the second knowledge construction task deepens students' understanding of core principles because they must abstract what they learned and look at it from a different perspective in order to apply it in a different situation.

To be considered an application of knowledge in a new context, it is not enough for the two contexts to differ only in surface features. Students cannot respond to the new situation simply by applying the same formula. Students must use interpretation, analysis, synthesis, or evaluation to decide how to use what they have learned in this new context.

ARE STUDENTS REQUIRED TO APPLY THEIR KNOWLEDGE?	
YES:	**NO:**
Students analyze demographic statistics from their hometown and then use their understanding of population trends to develop a plan for an upcoming housing development project. Students apply their knowledge from analyzing demographic statistics in order to develop a housing plan; this step requires further analysis.	**Students analyze demographic statistics from their hometown and then analyze demographic statistics from a second location of their choice.** Students do not apply their knowledge from analyzing demographic statistics to any new activity; they simply repeat the same activity with a different dataset.
Students examine photos enlarged at different sizes to develop an understanding of similarity and then apply that knowledge to abstract geometric shapes, thinking about size ratios and angles to determine which shapes are mathematically similar. Students apply their knowledge from evaluating shapes to deepen their own understanding of mathematical similarity.	**Students examine photos enlarged at different sizes to develop an understanding of similarity and then describe their understanding.** Students do not apply their knowledge from evaluating shapes to any new domain; they simply articulate that knowledge.
Students in theatre class analyze the characters in a play to learn about character development; then the students use Movie Maker to create their own one-act play demonstrating character development. Students apply their knowledge from their character analysis to create and develop their own characters; this step requires further interpretation and analysis.	**Students in theatre class analyse the characters in a play to learn about character development and then write an essay about what they learned.** Students do not apply their knowledge from their character analysis to any new task; they simply articulate that knowledge.
Students design and execute a procedure for testing the qualities of the tap water at their school. Once they have accurate data, they use that information to determine which water filtration system would be most appropriate for the school. Students apply their knowledge from designing and conducting water quality tests to select an	**Students design and execute a procedure for testing the qualities of the tap water at their school. They test the water and redesign the procedure iteratively until they have accurate data.** Although students apply their knowledge from previous trials to refine the procedure, they are only applying knowledge within a single (repeated) context. They are deepening

appropriate water filtration system, which forces them to look at what they have learned in a new way and deepen their knowledge.	their knowledge, but not extending it to a new type of application.

Interdisciplinary learning activities have **learning goals** that involve content, important ideas, or methods from different academic subjects (such as mathematics and music, or language arts and history). Subjects that are **typically taught together** in your country do not count as interdisciplinary.

For purposes of this rubric, ICT is NOT considered a separate academic subject. ICT is often used as a tool for learning in other subjects. For example, students might build ICT skills when they do online research for a history project. This activity is NOT considered interdisciplinary.

ACTIVITY	IS THIS INTERDISCIPLINARY?	
	YES:	**NO:**
Students in science class write persuasive letters to an environmental organization about the results of their experiment.	Educators grade students on the quality of their data AND on their writing skills.	Educators grade students only on the quality of their data.
Students in science class plot points on a graph.	Learning goals for both math AND science are defined.	No learning goals for math are defined.
Students in physics use ICT to present their work to the class.		Use of ICT as a tool in physics class is not considered interdisciplinary.

Knowledge Construction: Rubric

1

- The learning activity does NOT require students to construct knowledge**.** Students can complete the activity by reproducing information or by using familiar procedures.

2

- The learning activity DOES REQUIRE students to construct knowledge by **interpreting, analysing, synthesizing, or evaluating** information or ideas
- BUT the activity's main requirement is NOT knowledge construction.

3

- The learning activity's **main requirement** IS knowledge construction
- BUT the learning activity does NOT require students to **apply their knowledge in a new context**.

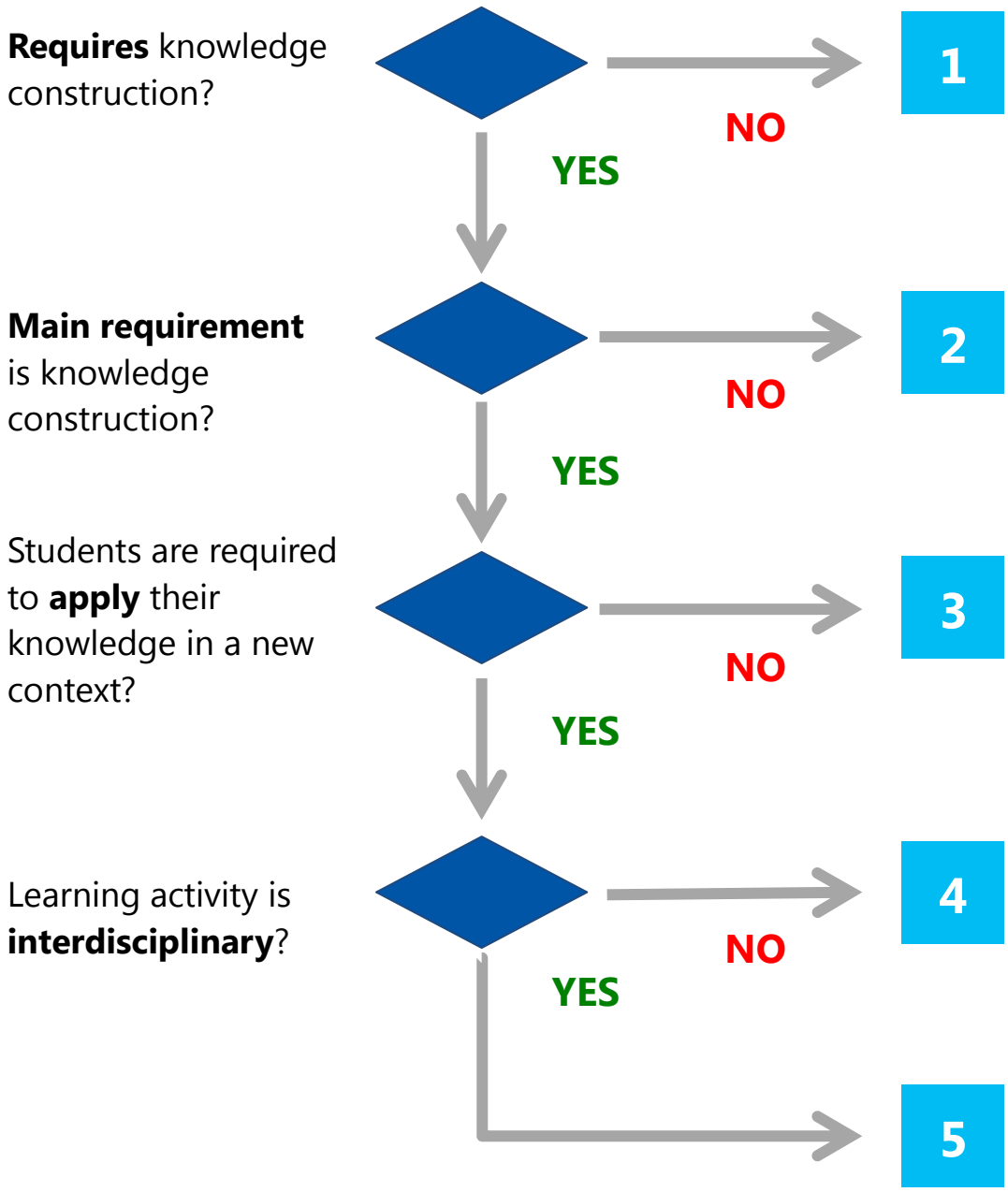
4

- The learning activity's **main requirement** IS knowledge construction
- AND the learning activity DOES require students to **apply their knowledge in a new context**
- BUT the learning activity does NOT have **learning goals in more than one subject**.

5

- The learning activity's **main requirement** IS knowledge construction
- AND the learning activity DOES require students to **apply their knowledge in a new context**
- AND the knowledge construction IS **interdisciplinary**. The activity DOES have learning goals in more than one subject.

Knowledge Construction: Decision Steps



Real-World Problem-Solving and Innovation

Does the learning activity require solving authentic, real-world problems? Are students' solutions implemented in the real world?

Overview

In today's workplace, problem-solving tasks abound. Whether the need is to find new ways to reach global markets or to redesign a product to take advantage of new materials, successful workers must be adept at generating and testing creative ideas in order to solve a problem with a real set of requirements and constraints. This is a very different definition of "problem" than we often see in academic settings, where textbook "problems" are simply practice at executing specific learned procedures.

This rubric examines whether students' work involves **problem-solving**, and uses data or situations from the **real world**. The strongest learning activities for this rubric:

- ask students to complete tasks for which they **do NOT already know** a response or solution
- require students to work on **solving real problems**
- represent **innovation** by requiring students to implement their ideas, designs or solutions for audiences outside the classroom.

Big Ideas

Problem-solving involves a task with a defined challenge for the student. Problem-solving happens when students must:

- develop a solution to a problem that is new to them OR
- complete a task that they have not been instructed how to do OR
- design a complex product that meets a set of requirements.

Learning activities that require problem-solving do NOT give students all the information they need to complete the task or specify the whole procedure they must follow to arrive at a solution.

Often, problem-solving tasks require students do some or all of the following:

- investigate the parameters of the problem to guide their approach
- generate ideas and alternatives
- devise their own approach, or explore several possible procedures that might be appropriate to the situation
- design a coherent solution
- test the solution and iterate on improvements to satisfy the requirements of the problem.

To count for this rubric, problem-solving must be the learning activity's **main requirement.**

IS THIS PROBLEM-SOLVING?	
YES:	**NO:**
Students must rewrite a story from the perspective of a character other than the narrator. Students use the original story but have not been instructed how to complete this task.	**Students read a story and then take a quiz about what they read.** Students do not have to develop any solutions. There is no defined challenge for the students.
Students use a map of a bus route to propose where pedestrian crossings should be added in a fictional town. Students have not been instructed where to put the crossings.	**Students learn about pedestrian safety by studying a map showing bus stops and pedestrian crossings.** There is no defined challenge for the students.
Students identify appropriate situations for using mean, median and mode by exploring several sample datasets in Microsoft Excel. Students have not been instructed on how each measure is best used.	**Students use Microsoft Excel to calculate the mean, median and mode of several sample datasets.** Students are simply practicing a computation.

Real-world problems are authentic situations and needs that exist outside an academic context. Real-world problems have **all** of the following characteristics:

- Are **experienced by real people**. For example, if students are asked to diagnose an ecological imbalance in a rainforest in Costa Rica, they are working with a situation that affects the real people who live there.

- Have solutions for a **specific, plausible audience** other than the educator as grader. For example, designing equipment to fit a small city playground could benefit the children of the community.
- Have **specific, explicit contexts**. For example, developing a plan for a community garden in a public park in their town has a specific context; learning which vegetables grow best in which parts of one's country does not.
- If students are using data to solve a problem, they **use actual data** (for example, real scientific records of earthquakes, results of their own experiments, or first-person accounts of an historical event), not data developed by an educator or publisher for a lesson.

ARE THESE REAL-WORLD PROBLEMS?	
YES:	**NO:**
Students rewrite a Shakespeare play for a teenage audience. Teenagers are a real, specific audience.	**Students rewrite a Shakespeare play in a new rhyme scheme.** This has no specific audience.
Students use their town's bus map to propose where pedestrian crossings should be added in their town. This has a specific, explicit context. Students use actual data to do this.	**Students use a bus map in a textbook to propose where pedestrian crossings should be added in a fictional town.** This does not involve actual data.
Students investigate whether growing plants in their classroom can improve the air quality. Even though the setting is the classroom, air quality is a real issue.	**Students investigate the interaction between green plants and carbon dioxide in the air.** There is no explicit context for the students' investigation.
Students analyze data about the basketball team and use Microsoft Excel to graph performance patterns for the overall team and individual players. Students are using actual data about the team and performing analysis typically conducted by the coaching staff.	**Students identify appropriate situations for using mean, median and mode by exploring several sample datasets in Microsoft Excel.** Students are using datasets created by the educator.

Innovation requires **putting students' ideas or solutions into practice in the real world**. For example, it IS innovation if students design *and build* a community garden on the grounds of their school; just designing the garden is NOT innovation.

In cases where students do not have the authority to implement their own ideas, it is innovation ONLY if students convey their ideas to people outside the classroom context who *can* implement them. For example, it IS innovation if students present their ideas for building

a community garden in a public park in their town to a local environmental group or to local officials, but NOT if students design a community garden for that public park and only share their plans with their teacher and classmates.

Innovation also **benefits people other than the student**; it has value beyond meeting the requirements of a classroom exercise. The townspeople who tend the new garden in the public park and the teenagers who attend the rewritten Shakespeare play benefit from students' efforts, for example.

It also counts as innovation if students create a project for a science fair or submit an original poem to a regional poetry contest, for example, because the fair and contest are not educator-controlled and have real audiences who are interested in and may benefit from the students' work.

IS THIS INNOVATION?	
YES:	**NO:**
Students rewrite a Shakespeare play for a teenage audience and perform it at a local youth center. The teenage audience at the youth center benefits from the students' effort.	**Students rewrite a Shakespeare play for a teenage audience but do not perform it.** No one outside the classroom benefits from the students' effort.
Students write letters to the town council about their ideas for adding pedestrian crossings in their town AND mail the letters to council members. Students cannot make new pedestrian crossings themselves but the town council can implement their ideas.	**Students write letters addressed to the town council about improving pedestrian safety BUT only give the letters to their educator to grade.** The letters did not reach an audience beyond the educator as grader.
Students investigate 2 or more online websites or games, develop a presentation using Community Clips and Windows Live Moviemaker about internet safety guidelines for parents and students to be aware of, AND present their products at parent's night. Parents and students who attend the parent's night presentation are an authentic audience for the guidelines that students developed.	**Students investigate 2 or more online websites or games, and develop a presentation using Community Clips and Windows Live Moviemaker about internet safety guidelines for parents and students to be aware of. Their product is handed in for a grade.** Students learned about internet safety but did not communicate their solutions to others who needed this information.

Students analyze statistics on the basketball team's past performance and create mathematical models using Microsoft Excel for the coach to illustrate targeted improvements for both team and individual performance. The coach can use students' analysis to help players focus their training on skills that need improvement.	**Students analyze data about the basketball team and use Microsoft Excel to graph performance patterns for the overall team and individual players.** Students' graphs are presented to the class as an academic exercise.

Real-World Problem-Solving and Innovation: Rubric

1

- The learning activity's main requirement IS NOT **problem-solving**. Students use a previously learned answer or procedure for most of the work.

2

- The learning activity's main requirement IS **problem-solving**
- BUT the problem IS NOT a **real-world problem**.

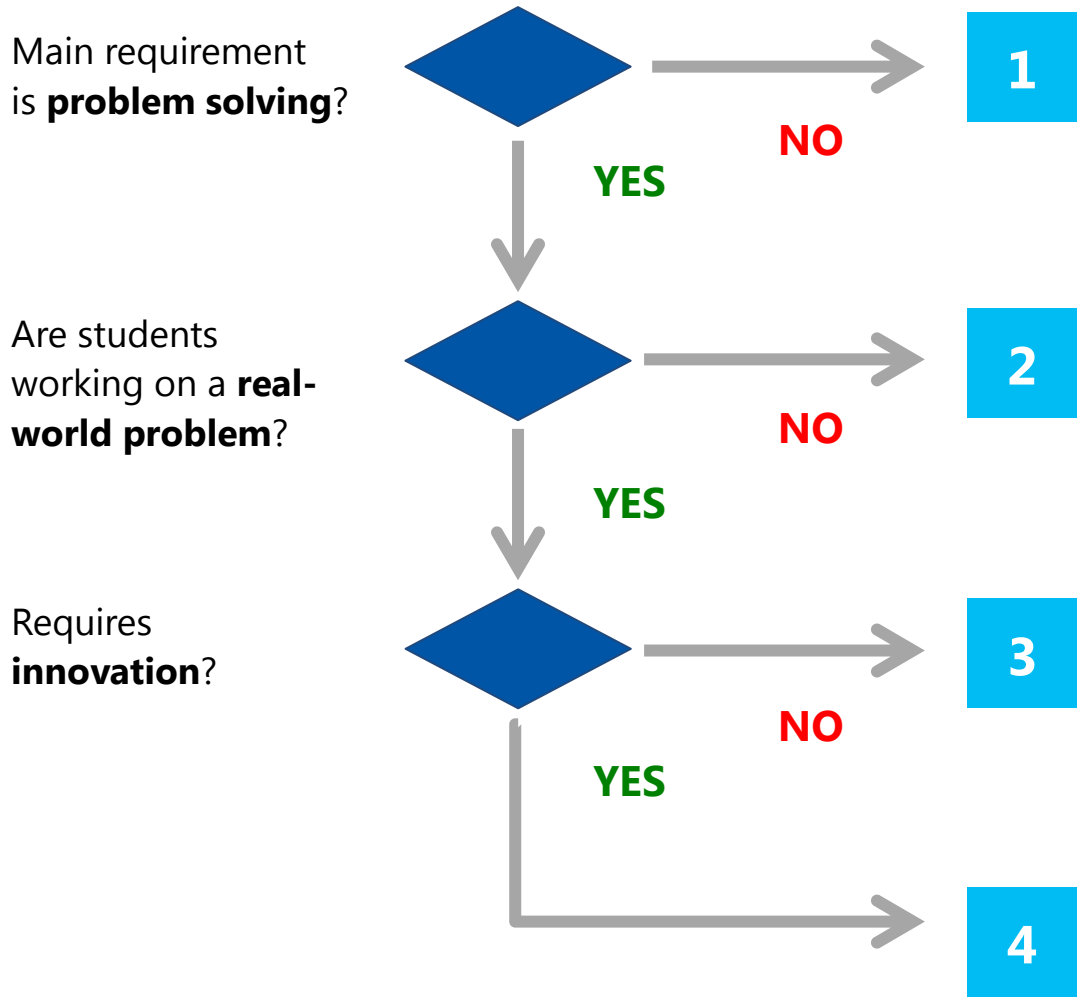
3

- The learning activity's main requirement IS **problem-solving**
- AND the problem IS a **real-world problem**
- BUT students DO NOT **innovate**. They are NOT required to implement their ideas in the real world, or to communicate their ideas to someone outside the academic context who can implement them.

4

- The learning activity's main requirement IS **problem-solving**
- AND the problem IS a **real-world problem**
- AND students DO **innovate**. They ARE required to implement their ideas in the real world, or to communicate their ideas to someone outside the academic context who can implement them.

Real-World Problem-Solving and Innovation: Decision Steps



Use of ICT for Learning

Are students passive consumers of ICT, active users, or designers of an ICT product for an authentic audience?

Overview

We live in a connected world with unprecedented access to a vast array of digital information and experiences. The use of technology continues to transform how we live and work. On-going adoption of new advances in ICT has become more essential to both life-long learning and life-long earning. In today's globalized, knowledge-based economies, individuals increasingly need skills not only to intelligently consume information and ideas, but also to design and create *new* information and ideas using ICT.

While ICT is becoming increasingly common in classrooms and learning environments, it is often used to present or consume information rather than to fundamentally transform learning experiences. This ITL rubric examines *how* students use ICT— and whether it is used in more powerful ways to construct knowledge or to design knowledge-based products.

In this rubric, the term "ICT" encompasses the full range of available digital tools, both hardware (computers and related electronic devices such as tablets and notebooks, e-readers, smart phones, personal digital assistants, camcorders, graphing calculators, and electronic whiteboards) and software (including everything from an Internet browser and multimedia development tools to engineering applications, social media, and collaborative editing platforms).

ICT is a powerful tool to promote and support a wide range of 21st century skills, including all other Learning Design rubrics. For example, ICT can help students to collaborate in ways that were not possible before, or to communicate through new mediums of expression. In this rubric we focus on the interaction of ICT use with two rubrics in particular: knowledge construction and real-world problem-solving and innovation. These are not the only important ways that ICT can support innovative teaching and learning, but they represent particularly powerful uses.

Big Ideas

Student use of ICT happens when students use ICT directly to complete all or part of the learning activity. The educator's use of ICT to present materials to students does not count as student use: it is important that students have control over the ICT use themselves. Some educators' use of ICT can enhance their teaching significantly: for example, educators can show simulations that make difficult content easier for students to visualize. However, this rubric focuses only on how the learning activity requires *students* to use ICT in their learning.

This rubric looks at the **opportunities** students have to use ICT. It is considered ICT use if the students **are required to** use ICT or **can use ICT** to complete an activity.

IS THIS STUDENT USE?	
YES:	**NO:**
Students complete a math learning activity by using Excel spreadsheet software.	Students complete a math learning activity by using worksheets that the educator has printed out from the computer.
Students learn about cell replication by using a software simulation to explore the process.	Students learn about cell replication by watching the educator demonstrate a software simulation of the process.
Students use Microsoft OneNote to edit their writing, tracking their changes as they go.	The educator uses Microsoft OneNote to make and track suggested changes to the student's writing.

Knowledge construction occurs when students generate ideas and understandings that are *new to them*, through **interpretation, analysis, synthesis,** or **evaluation**. This rubric examines whether the learning activity requires that students use ICT in ways that **support knowledge construction,** either directly or indirectly.

ICT **supports knowledge construction** when:

- Students use ICT directly for the knowledge-construction part of a learning activity. For example, students use a computer to analyze scientific information.
- Students use ICT to indirectly support knowledge construction, by using ICT to complete one step of an activity, and then using information from that step in the knowledge-construction part of the activity. For example, students might search for terms related to current events on Twitter and then analyse people's responses offline. The information they found on Twitter supported their analysis, so we say that ICT use supported knowledge construction.

The knowledge construction supported by ICT must be about the learning goals of the activity: learning to use the ICT does not qualify. For example, students might learn about PowerPoint as they create a presentation for history class. But to be considered knowledge construction using ICT, it is essential that the use of PowerPoint helped them to deepen their interpretation, analysis, synthesis, or evaluation of historical ideas, not just to deepen their knowledge on how to use the tool.

Evaluation of Internet resources related to the learning goals is also considered knowledge construction. Some learning activities are designed to help students become intelligent, ethical users of Internet resources rather than passive consumers of the information. For example, students might be required to find several sources on a topic and evaluate their credibility before they select which information to rely on.

DOES THIS STUDENT USE SUPPORT KNOWLEDGE CONSTRUCTION?	
YES:	**NO:**
Students use Excel spreadsheet software to analyse results of an experiment.	Students use Excel spreadsheet software to add numbers together.
Students use a computer-based simulation to investigate how stars are formed.	Students watch a video about how stars are formed.
Students use StickySorter to create interconnected plot and character diagrams for the novel they are reading in literature class.	Students use StickySorter to make a list of the characters in the novel they are reading in literature class.
Students use Kinect (Xbox) Driving Games to research and publish the effects of texting while driving.	Students play with Kinect (Xbox) Driving Games.
Students write an essay on a computer, using the Microsoft OneNote to help organize and synthesize their ideas in writing.	Students use Microsoft OneNote to type an essay they have written.
Students use AutoCollage to create a composite image that reflects the style and influences of an artist of their choice.	Students use AutoCollage to create a composite image of art works by an artist of their choice.
Students who have not learned about triangles experiment with Microsoft Mathematics graphing calculator tool by entering angle degrees and hypothesizing about the total number of degrees in a triangle.	Students who have already learned about triangles use the Microsoft Mathematics graphing calculator tool to create triangles by entering angle numbers that add up to 180 degrees.

ICT is required for the knowledge construction when it allows students to do knowledge construction activities that would be impossible or impractical without the use of the ICT. For example, students might be asked to communicate with students in another country over a period of two weeks to research the impact of a recent drought on their community. In this case, email enables students to construct knowledge that they could not construct without ICT because mailing physical letters would be impractical in this short a time. The use of email is required for constructing this knowledge.

Many activities that require knowledge construction can also be done without ICT. For example, students may be asked to find information about the beaks of a variety of bird species with different diets and develop categories of different types of beaks. If students use the Internet for this activity, they are constructing knowledge, but ICT is not required: they would be able to achieve the same learning goals without ICT by using printed books in a library.

IS ICT REQUIRED FOR THIS KNOWLEDGECONSTRUCTION?	
YES:	**NO:**
Students use the Internet to find newspaper articles about a current event from three different countries, and analyse how the perspectives are similar or different. In this school, current newspapers from other countries are not available in hardcopy.	**Students read the local newspaper online to research a current event and analyse three stories they find.** The local newspaper is probably available to students in hardcopy.
Students use a computer-based simulation to investigate how stars are formed. The simulation helps deepen students' knowledge about events that cannot be directly observed.	**Students use a spreadsheet to compute totals that they will use to analyse their data.** The calculations can also be done by hand.

Students are **designers** of ICT products when they **create ICT products that others can use.** For example, if students record a podcast and make it available on the Internet, they are creating an ICT product others could use. The product lasts beyond the learning activity and can be used or enjoyed by an outside audience.

When students act as designers, ICT is supporting their real-world problem-solving and innovation. Students must have an authentic audience in mind, such as a community that needs the information their podcast will provide, or younger students who will learn about disease prevention from the simulation students are building. In their design, students must attend to the needs and preferences of that audience. Ideally, but not necessarily, the product might actually be used by the intended audience. Students who create a product with no particular audience in mind do not qualify as designers under this definition.

ARE STUDENTS DESIGNERS OF AN ICT PRODUCT?	
YES:	**NO:**
In computer programming class, students use TouchDevelop to design and program a mobile smarthphone app that could help senior citizens in their daily lives. The students build knowledge of computer programming AND must consider the needs of senior citizens in order to create an app that would be useful for that population.	**In computer programming class, students use TouchDevelop to program a mobile smartphone app that causes the phone to vibrate any time the user takes a photo.** The students build knowledge of computer programming, but they do not consider any end users.
Students use SongSmith to create songs to educate visitors to the children's natural history museum about dinosaurs. Students must think about the interests and ability level of museum visitors to create a song with appropriate content and music.	**Students use SongSmith to create songs about dinosaurs that they will post on the Internet for general access.** Students do not need to consider any specific end-users.
Students create videos of their own interviews with local community members that will air on a local television channel program about "our community". Students must consider the television audience and adhere to television programming parameters (e.g., time limits).	**Students create videos of their own interviews with local community members to submit to the educator for the end-of-year assignment.** Students do not need to design for any particular audience.
Students use the Internet to research and communicate with local food producers and then develop an app to help families in their community make more local choices when they buy their food. Students must design the app to be accessible and usable to local families.	**Students use the Internet to research local food producers and write a report of their findings to submit to the educator.** Students do not create an ICT product or need to consider the needs of any particular audience.

Use of ICT for Learning: Rubric

1

- Students **do not have the opportunity to use ICT** for this learning activity.

2

- Students **use ICT to learn or practice basic skills or reproduce information.** They are not constructing knowledge.

3

- Students **use ICT to support knowledge construction**
- BUT they could construct the same knowledge without using ICT.

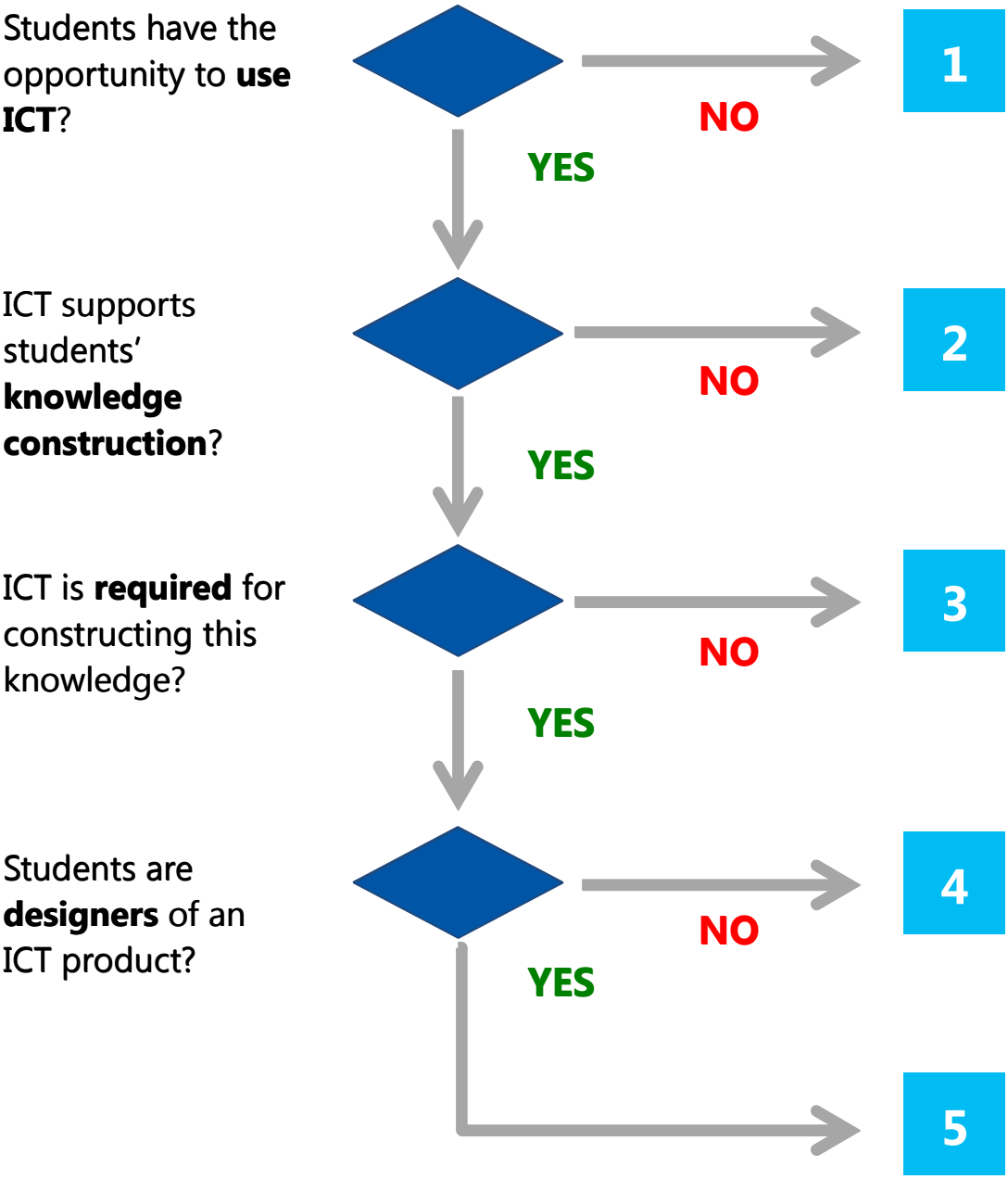
4

- Students **use ICT to support knowledge construction**
- AND the ICT is **required for constructing this knowledge**
- BUT students do NOT create an ICT product for authentic users.

5

- Students **use ICT to support knowledge construction**
- AND the ICT is **required for constructing this knowledge**
- AND students do **create an ICT product for authentic users**.

Use of ICT for Learning: Decision Steps



Self-Regulation

Is the learning activity long-term? Do students plan and assess their own work, and revise their work based on feedback?

Overview

Today's complex world demands self-regulated thinkers and learners who can take responsibility for their lives, their work, and their ongoing learning. It requires individuals to monitor their own work and to incorporate feedback to develop and improve their work products.

In most traditional classrooms, educators structure students' work for them, directing them in exactly what to do and monitoring compliance. To create opportunities for students to learn effectively and monitor their own progress, educators can instead work *with* them, guiding and empowering them in ways that help them take increasing responsibility for their own learning, both as individuals and in groups. In turn, this supports students' ability to function in a 21st century workplace, where people are expected to work with minimal supervision, planning their own work, designing their own work products and incorporating feedback to improve the quality of those products.

Learning activities that give students the opportunity to acquire self-regulation skills must last long enough for students to have the opportunity to plan their work over time, and offer visibility into clear learning goals and success criteria that students can use to plan and monitor their own work. Educators can foster self-regulation skills by giving students working in groups responsibility for deciding who will do what and on what schedule. In the most successful learning activities, students receive feedback that is supportive of students' progress toward clear learning goals, and they have the opportunity to act on that feedback to improve their work before it is considered final.

Self-regulation involves a range of skills that become increasingly sophisticated as they develop over time. At the beginning of a semester, students who are new to self-regulation may need more explicit guidance; over time, it can be a goal for educators to give students progressively more responsibility for their own learning.

Big Ideas

A learning activity is considered **long-term** if students work on it for a substantive period of time. If the learning activity is completed within a single class period, there is no time for students to plan the process of their work nor to improve their work over multiple drafts. Length of time is a basic prerequisite for students' opportunity for self-regulation.

IS THIS LEARNING ACTIVITY LONG-TERM?	
YES:	**NO:**
Students keep a journal about their nutrition over the course of a week.	Students document what they ate on two different days.

Learning goals define what is to be learned in this activity and how these goals fit with prior and future learning.

Success criteria are the factors that will be considered to determine whether the learning goals have been met: the evidence of student progress and success in this learning activity.

When students **have learning goals and associated success criteria in advance** of completing their work, it is possible for them to examine the progress and quality of their own work as they do it. The educator might provide learning goals and associated success criteria to students, or the class might negotiate the learning goals and success criteria together to foster more student ownership. An understanding of these factors early in the learning activity is another important prerequisite for students' opportunity for self-regulation.

When students **plan their own work**, they make decisions about the schedule and steps they will follow to accomplish the task. Planning their own work may involve:

- Deciding how: Students break down a complex task into simpler sub-tasks, or choose the tools they will use.
- Deciding when: Students create a schedule for their work and setting interim deadlines.
- Deciding who: A group of students determines how to divide work among themselves.
- Deciding where: Students decide what pieces of the work will be done inside or outside of the school building or the school day.

If a task is long-term but students are given detailed instructions and timelines, they do NOT have the opportunity to plan their own work. Students making decisions about small aspects of tasks does NOT qualify as planning their own work.

	ARE THESE STUDENTS PLANNING THEIR OWN WORK?	
Learning Activity:	YES:	NO:
Over two weeks, students work in groups to research and debate climate change with their classmates.	Students decide who will research which aspects of the topic and who will speak at different points in the debate.	The educator assigns specific roles to each student.
	Students make their own deadlines for completing their research, writing their speeches, and practicing them.	Students follow the steps and timeline provided by the educator.

Students **have the opportunity to revise their work based on feedback** when feedback is given and explicitly used to improve the work before it is submitted or finalized.

Feedback may come from the educator or from peers. Students might also have the opportunity to revise their work based on their own deliberate process of self-reflection.

Feedback can be one of the most significant influences on improving learning. Effective feedback helps students to address the gap between current performance and performance goals. It is more than simple praise; comments such as 'good job' or 'great work' do little to help the student understand what constitutes great work. Effective feedback:

- Tells the student specifically what he or she is doing well and offers specific guidance to help move their learning forward
- Is directly connected to the learning goals and success criteria
- Helps the student to be more aware of progress along a learning path
- Leads to reflection and planning of next steps.

	DO THESE STUDENTS HAVE OPPORTUNITY TO REVISE WORK BASED ON FEEDBACK?	
Learning Activity:	**YES:**	**NO:**
Students learn about environmental conservation and create games in Kodu where players make decisions to preserve the environment.	After developing a beta version of their game, students trade games with a partner and give each other feedback to improve their games before turning them in.	Students post the first version of their games for classmates to play, without opportunities to receive or implement feedback.
Students create PowerPoint presentations about a topic in world history.	Students do practice presentations, receive feedback from their educator and peers, and revise their presentation based on feedback before doing a final presentation.	Students do their final presentation without any opportunity for practice, feedback, or revision.
Students write persuasive essays that will be assessed according to a rubric that the educator shared with students at the beginning of the learning activity.	Students use the rubric to reflect on their own essay drafts and make revisions.	Students use the rubric only after getting back their graded essays, to see why the educator gave them a certain grade.

Self Regulation: Coding Rubric

1

- Pre-requisites for self-regulation are NOT in place:

- The learning activity is NOT long-term
- OR students do NOT have both learning goals and associated success criteria in advance of completing their work.

2

- The learning activity IS **long-term**
- AND students DO have **learning goals and associated success criteria** in advance of completing their work
- BUT students DO NOT have the opportunity to plan their own work.

3

- The learning activity IS **long-term**
- AND students DO have **learning goals and associated success criteria** in advance of completing their work

- AND students DO have the opportunity to **plan their own work**
- BUT students do NOT have the opportunity to revise their work based on feedback.

4

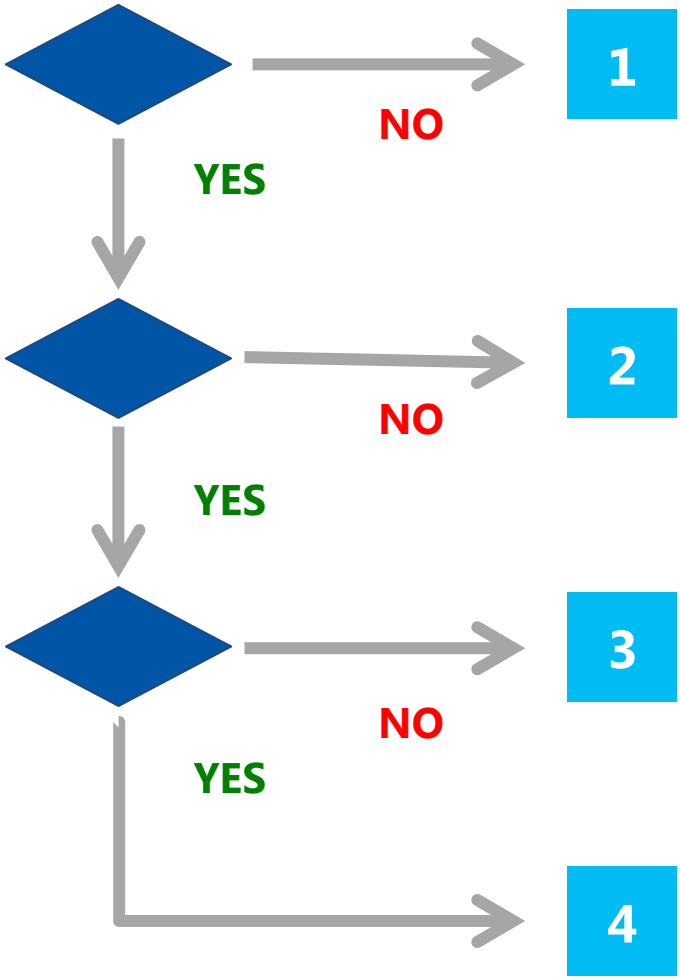
- The learning activity IS **long-term**
- AND students DO have **learning goals and associated success criteria** in advance of completing their work
- AND students DO have the opportunity to **plan their own work**
- AND students DO have the opportunity to **revise their work based on feedback**.

Self-Regulation: Decision Steps

Long-term activity **AND** students have **learning goals and success criteria** in advance?

Students **plan** their own work?

Students have opportunity to **revise** work based on feedback?



Skilled Communication

Are students required to communicate their own ideas regarding a concept or issue? Must their communication be supported with evidence and designed with a particular audience in mind?

Overview

Communication is at the heart of all human interaction. In the 21st century, developing technologies have created new opportunities for communication that is spoken, written, visual or multimodal; in print or digital forms; and with broader reach and fewer barriers than ever before. In contemporary communication the active process of communication is often seen as being as important as the end product. Nevertheless, digital capture and publication of even informal communications mean that those products persist longer and disseminate farther than ever before. As a result, the need for effective communication is no longer confined to language classes and journalism careers. It is important for students in all areas of academic study, and in future roles that range from office worker to lawyer to scientist, to be able to communicate clearly and persuasively with a variety of audiences and subjects.

This rubric examines whether students are asked to produce extended or multi-modal communication, and whether the communication must be substantiated, with a logical explanation or examples or evidence that supports a central thesis. At higher levels of the rubric, students must craft their communication for a particular audience.

21st century communication can take many different forms. For example, as part of a learning activity students may have a discussion with a peer over Skype. In this rubric, we don't focus on informal classroom talk, whether face-to-face or electronic. Instead, we focus on activities that require students to articulate their ideas in a permanent form: a presentation, a podcast, a written document, an email, etc. A performance (for example, a skit or oral debate) would also be considered in this rubric. We recognize that less formal conversational media are also very important aspects of communication. But effective uses of Skype will have an outcome related to the learning goals of the activity: do students produce a summary of what they learned through Skype, or build that learning into the final product they are creating? This rubric evaluates the skilled communication requirements of the products or outcomes of the students' work.

Big Ideas

Extended communication is required when student must produce communication that represents a set of connected ideas, not a single simple thought. In written work, extended communication is the equivalent of one or more complete paragraphs rather than a sentence or phrase. In electronic or visual media, extended communication might take the form of a sequence of video, a podcast, or a page of a presentation that connects or illustrates several ideas.

A single text message or tweet is NOT extended communication. If students are engaged in electronic communication, this is ONLY considered extended communication if it produces an outcome that requires students to connect the ideas they discussed (for example, producing documentation of what they learned or next steps for resolving an issue that arose). The duration of an electronic chat is not considered in evaluating extended communication.

DOES THIS LEARNING ACTIVITY REQUIRE EXTENDED COMMUNICATION?	
YES:	**NO:**
Students host a webinar where they present on different topics about their city to peers in their sister-city and then answer follow-up questions.	Students participate in a webinar where they listen to presentations by peers from their sister-city and then ask follow-up questions.
Students write an extended proof to demonstrate the solution to a geometry problem.	Students solve a geometry problem, but do not write any proof.
Students write a letter to the editor in response to a recent news article of their choice.	Students post a one-sentence comment in response to a recent news article of their choice.
Students hold a Skype conversation with peers from another school to create a plan for the performance they will put on together about the novel they read.	Students hold a Skype conversation with peers from another school to talk about the novel they read.

Communication is **multi-modal** when it includes more than one type of communication mode or tool used to communicate a coherent message. For example, students might create a presentation that integrates video and text, or embed a photograph into a blog post. The communication is considered multi-modal only if the elements work together to produce a stronger message than any one element alone.

If the learning activity offers students the opportunity to choose the tool or tools they will use to communicate, we consider it to be a multi-modal communication opportunity.

IS THIS COMMUNICATION MULTI-MODAL?	
YES:	**NO:**
Students create a print, radio, or television advertisement for their new invention. The learning activity allows students to choose what type of media to use.	**Students create a radio advertisement for their new invention.** The learning activity does not offer students any choice regarding the type of media, nor does it imply the use of multiple media.
Students write lab reports about their science lab on density of matter, including narrative text and visual evidence of what the students saw in their experiment (such as drawings or screen shots of real-time data displays). The learning activity requires multiple modes of media that work together for a more complete description of the experiment.	**Students write lab reports about their science lab on density of matter, including only narrative text.** The learning activity requires only one mode of media.
Students produce blog posts on a hurricane for their journalism class, including a written description of the conditions and additional audio or visual media. The learning activity requires multiple modes of media to add depth to the students' descriptions.	**Students produce a podcast on a hurricane for their journalism class, including a written script and the final audio podcast.** The story is the same whether written out (in the script) or spoken (in the podcast); multiple media are not used to enhance the content of the communication.

Communication **requires supporting evidence** when students must explain their ideas or support their thesis with facts or examples.

For this rubric, a "thesis" is a claim, hypothesis, or conclusion. Students must have a thesis when they are asked to state a point of view, make a prediction, or draw a conclusion from a set of facts or a chain of logic. The communication requires evidence if students must describe their reasoning or provide supporting facts or examples. The evidence should be sufficient to support the claim that the student is making.

DOES THIS LEARNING ACTIVITY REQUIRE SUPPORTIVE EVIDENCE?	
YES:	**NO:**
Students must write an essay about why global warming is a problem. This learning activity asks students to state and defend a claim about global warming.	**Students must write an essay about global warming**. Students can complete this activity with a set of facts; they do not have to state and support a claim, hypothesis, or conclusion.
Students must describe their derivation of a mathematical equation. The learning activity asks students to explain the logic that brought them to a conclusion about the equation.	**Students must derive a mathematical equation**. Students can compute the equation without explaining their logic.
Students must write a blog post about the main themes from *Alice in Wonderland*, with examples from the story to illustrate their point. Students are required to support their proposed themes with examples.	**Students must write a blog post listing the main themes of *Alice in Wonderland*.** Students are not required to justify their themes with evidence from the story.
Students must write a journal entry from the perspective of a slave. They must state a perspective or a point of view about their imagined life, and describe their day with historical accuracy to support that perspective. The learning activity requires students to use historical details as evidence to support their perspective.	**Students must write a journal entry from the perspective of a slave. They must describe their day with historical accuracy**. The learning activity does not require students to state or support a perspective.
Students use Microsoft Community Clips to video themselves solving a mathematical problem, including both the steps they took and their reasoning. The learning activity requires students to explain both their process and their thinking.	**Students use Microsoft Community Clips to video themselves solving a mathematical problem, stating the steps they took.** The learning activity simply requires students to narrate their process.

Students are required to **design their communication for a particular audience** when they must ensure that their communication is appropriate to the specific readers, listeners, viewers, or others with whom they are communicating. It is not sufficient for students to be communicating to a general audience on the internet. They must have in mind a specific group with specific needs in order to shape their communication appropriately.

When they are communicating with a particular audience, students must select the tools, content, or style that they use to reach the audience. They might be required to consider what tools the audience has access to or uses on a regular basis; the relevant information they must present in order for the audience to understand their thesis; or the formality or informality of the language they choose in order to be appropriate to the audience.

To qualify for this idea the learning activity might specify a particular audience, or students might be allowed to select their own audience. It is ideal, but not essential, if the communication will actually be seen by that audience. The requirement is that the students must develop their communication with that audience in mind. For example, students might develop some type of presentation to teach younger students about how to divide fractions. They will have to decide what medium to use to reach those students (for example, a podcast), and what type of language and content the students would understand and relate to. This satisfies the requirement even if the podcast is never used by younger students.

Many teachers find that it is useful to specify an audience of a different age or background than the students themselves in order to highlight the need to think about the audience for a communication and what they will and will not understand and find interesting.

ARE STUDENTS REQUIRED TO DESIGN THEIR COMMUNICATION FOR A PARTICULAR AUDIENCE?	
YES:	**NO:**
Students must create a video about their school, using appropriate imagery and evidence, to welcome the incoming students in the coming school year. Students must design the video to help the incoming students feel welcome and enthusiastic about attending.	**Students must create a video about their school, using appropriate imagery and evidence.** There is no specified audience or purpose for the video.
Students must write a letter to a company, suggesting improvements to a product. Students must consider the arguments and perspectives that will be most compelling to the company.	**Students must write an essay about their ideas for improving a particular product.** The students do not need to consider any particular audience.
Students must design a "rocks and minerals" exhibit for the town library. The learning activity requires students to communicate a message through the exhibit, which must include rock & mineral samples, different media presenting information to capture visitor interest, and take-home pamphlets for exhibit visitors. Students must design their communications to be appropriate to the museum audience.	**Students must do a "rocks and minerals" science project. The learning activity requires students to communicate a central finding, include rock & mineral samples, narrative text and/or audio information.** Students will submit the project to the teacher and do not need to consider any particular audience.

Skilled Communication: Rubric

1

- Students are NOT required to produce extended or multi-modal communication.

2

- Students ARE required to produce **extended communication** or **multi-modal communication**
- BUT they are NOT required to **provide supporting evidence** OR design their work for a **particular audience**.

3

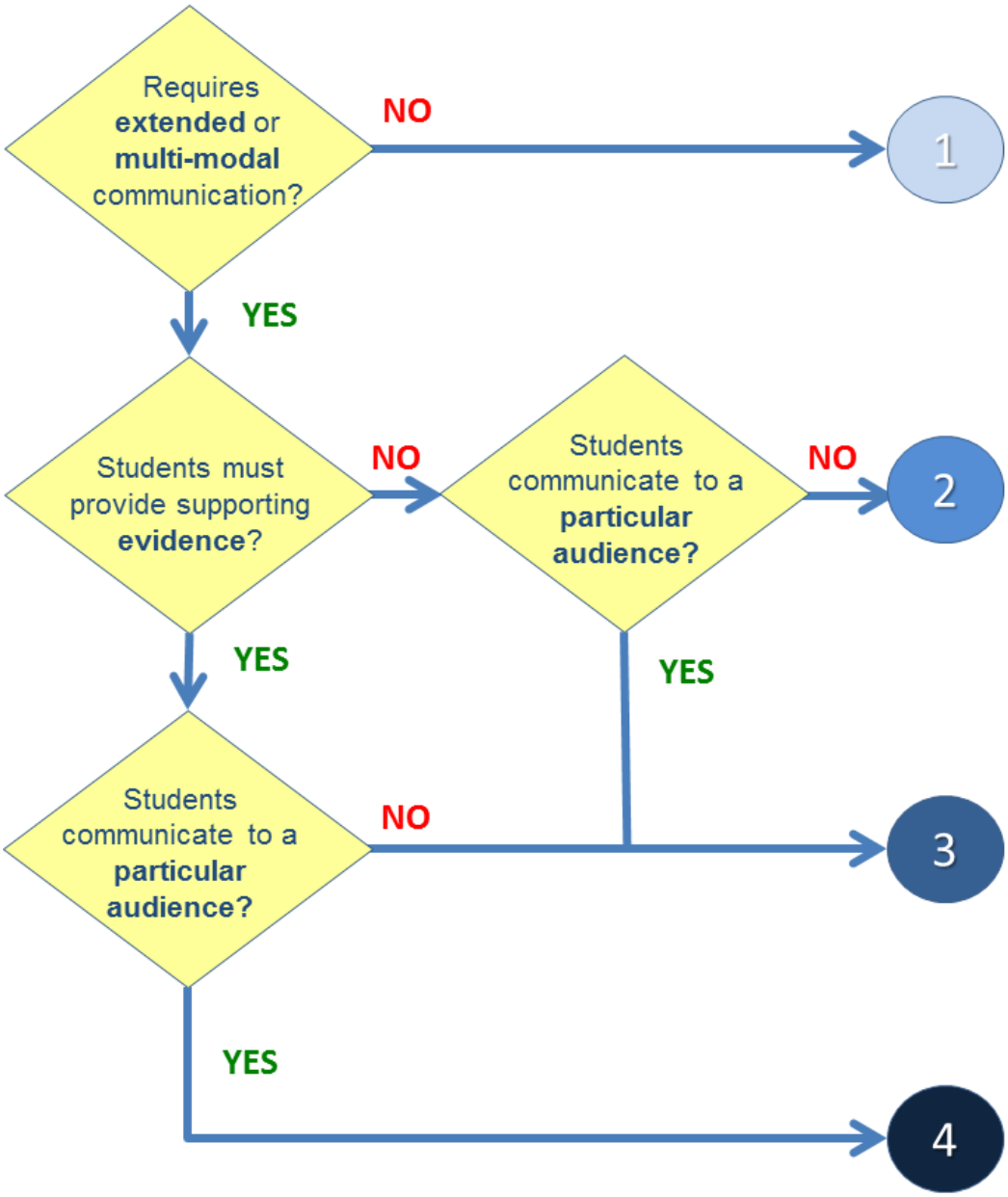
- Students ARE required to produce **extended communication** or **multi-modal communication**
- AND they ARE required to **provide supporting evidence**: they must explain their ideas or support a thesis with facts or examples
  OR
- They ARE required to design their communication for a **particular audience**

  BUT not both.

4

- Students ARE required to produce **extended communication** or **multi-modal communication**
- AND they ARE required to **provide supporting evidence**
- AND they ARE required to **design their communication for a particular audience**.

Skilled Communication: Decision



Steps