

## Primary School Computing Curriculum

(The curriculum is a work in progress. You can access the google document [here](#) to add in comments and feedback.)

This curriculum begins from the premise that happy children make good learners. Thus we place the well being, safety and comfort of the child first. Furthermore we believe that learning is facilitated by a trusting relationship between student and teacher. Thus we put significant emphasis on building a strong trusting relationship with our students. Finally, we believe the learning is a social process, where one's interactions with one's peer, is as important as one's interactions with one's teachers. Thus this curriculum encourages teachers to allow children to interact and learn from each other in the classroom. In school environments where it is possible we recommend that students across grade levels be permitted to collaborate and learn from each other.

In the next generation computing is poised to have big impact across South Asia. Governments in the region are trying to improve citizen services through e-governance. At the same time the private sector is investing in e-commerce and educating an increasingly number of consumers on how to use digital services. Supporting both these trends is the increasing penetration of mobile phones and data services. Along with the benefits of increased connectivity the region is also experiencing challenges. The use of WhatsApp groups to incite mob violence and the use of digital community to radicalize youth are among those challenges. Thus, it important not only to teach young people how to create and use technology, but also to socialize them on how to be good digital citizens.

Understanding the importance of computing the Sustainable Development Goals, which the government of Nepal is a party to, ask for increased investment in computing to meet the SDG. In fact, the SDG 4.4.1 indicator proposes to specifically measure computing learning in students. These changes alone would make it important to have a citizenry that is has strong computing skills. However there is another important reason. The changes wrought by technology are difficult, even for the experts, to see and predict. Thus Nepali children must be prepared for a VUCA (Volatile Uncertain Complex Ambiguous) environment ushered by the 4th industrial revolution in which trends such as Big Data, Artificial Intelligence, Cyber-physical Systems and the Internet of Things can impact both their society and livelihood.

To address this future it is necessary for students' learning to rest on 4 pillars.

### Career and Motivation

The first step for children is to understand why all this matters. This section is dedicated towards developing an understanding of the impact of technology in our society. Students need to be made aware of existence of technologists and the work they do.

### Computational Thinking (CT)

The omnipresence of screens and programmable chips - in mobile phones, computers and even microwave ovens - means that today's children will be forced to interact with technology. Their ability to interact with technology in creative and meaningful way will be critical to their own livelihoods as well as that of the region. Computing has begun to influence disciplines and professions from beyond engineering to science, economics, finances, archaeology, journalism, humanities to name a few.

Computational thinking describes the mental activity in formulating a problem to admit a computational solution. It allows one to understand how to interact with computers. Problem solving, analyzing the validity of solutions and spotting patterns in data - these are all essential skills for real life which can be taught through computational thinking.

**Design and Visual Communication**

Human brains are hardwired to process images quickly, and that means visuals work better than audio and words, when trying to get your message across. This makes visual communication the most effective way of passing on information. With the increasing access to screens, social media and high speed internet people are increasingly using videos, illustrations and pictures to share their information. Design and visual communication skills today have become as essential as typing skills 25 years ago, and need to be fostered in children from a very early age.

**Digital Citizenship**

With everyone using internet on a regular basis, we are all active digital citizens. Addressing the 21st century skills of digital citizenship is important; to help students to learn, communicate and collaborate safely online. The fact that a lot of young children embrace technology everyday without examining the consequence of their actions online, it is essential to bring in digital citizenship into the curriculum.

## Terminal Competencies for different Grade Levels

Terminal Competencies	Career and Motivation	Design and Visual Communication	Digital Citizenship	Computational Thinking
Grade 1	Students are aware that they are technologists in Nepal	Students will create offline infographics on paper from data gathered from their peers	Students will learn that students should be respecting people offline and online	Student will understand the algorithm are set of instructions and implement them with offline objects
Grade 2	Students are aware of the impact technology can have on society		Students need to identify that strangers online are similar to strangers offline	Students will be able to match algorithms to specific tasks Students will analyze and decompose simple objects
Grade 3	Students are aware that they are technologists in South Asia with emphasis on their home country  Students are aware of the impact technology can have on society  Student explore in detail how technologies apply to their life and society	Students will create offline infographics on paper on topics of social importance  Students will learn to provide and receive feedback on their design  Students will learn to design basic visual communication using digital tools (in Scratch Jnr)	Students will learn about safe online communities that students can belong to  Students will learn to communicate to parents about online communities that they want to join	Students will analyze and decompose simple tasks  Students will be able to write simple algorithms for simple tasks and implement them on Scratch Jr
Grade 4	Students will learn about the skills required for professionals in the tech industry  Students will learn about a case study of how TMPI applies to a simple piece of technology	Students will learn how to use a real world digital design tool (preferably inkscape)  Students will demonstrate an understanding of design principles accordingly to their grade level  Students will learn to receive and provide feedback on their design using design principles taught at grade level	Students will learn to properly manage and protect their personal information in the internet  Students will learn what information to share and what not to share	Students will be able to write and read simple algorithms for simple tasks and implement them according to their grade level  Student will be able to debug faulty programs/code according to their grade level  Students will be able rearrange the sequencing and remixing of codes according to their grade level  Students will learn to iterate in their project according to their grade level
Grade 5	Students will learn about the skills required for professionals in the tech industry  Students will learn about a case study of how CT applies to a simple piece of technology	Students will be able to conduct a digital survey to collect data  Students will demonstrate an understanding of design principles accordingly to their grade level  Students will learn to receive and provide feedback on their design using design principles	Students will learn to identify and differentiate fake and valid source of information in the internet  Students will learn how to search information in the internet  Students will be able to use and attribute information	Students will be able to write simple algorithms for simple tasks and implement them according to their grade level  Student will be able to debug faulty programs/code according to their grade level  Students will be able to recognize different problem solving patterns

		taught at grade level		<p>Students will be able rearrange the sequencing and remixing of codes according to their grade level</p> <p>Students will learn to iterate in their project according to their grade level</p> <p>Students will learn to identify blocks of codes that execute a specific function. They will be able to decompose the tasks given to them and implement it in Scratch</p>
--	--	-----------------------	--	--

## Learning Outcomes

### Career and Motivation

Terminal Competencies	Grade 4 (learning outcomes)	Grade 5 (learning outcomes)
Students will learn about skills required for professionals in the tech industry	<ol style="list-style-type: none"> <li>1. Students are aware that coding / programming is essential skill to build new technologies</li> <li>2. Students will be aware of South Asian (with emphasis on their home country) technologists and South Asian coding companies</li> </ol>	<ol style="list-style-type: none"> <li>1. Students will learn about the diversity of skills required in the tech industry (designers, coders, managers etc)</li> </ol>
Students will learn about a case study of how TMPI applies to a simple piece of technology	<ol style="list-style-type: none"> <li>1. Students will learn about a case study of how TMPI applies to a simple piece of technology</li> </ol>	
Students will learn about a case study of how CT applies to a simple piece of technology		<ol style="list-style-type: none"> <li>1. Students will learn about a case study of how CT applies to a simple piece of technology</li> </ol>

### Computational Thinking

Terminal Competencies	Grade 4 (learning outcomes)	Grade 5 (learning outcomes)
Students will be able to write simple algorithms for simple tasks and implement them according to their grade level	<ol style="list-style-type: none"> <li>1. Students will be able to test a program that they wrote using their own prediction</li> <li>2. Students will be able to understand the code written by their peers and predict what they do</li> <li>3. Students will be able to write a program using loops to repeat tasks in a program</li> <li>4. Students will be able to write programs that execute two or more instructions in parallel</li> <li>5. Students can write a program that take an input from the user to trigger certain set of events</li> </ol>	<ol style="list-style-type: none"> <li>1. Students will be able to write pseudo codes of programs they want to implement</li> <li>2. Students will be able to write an algorithm by breaking down a big problem into smaller parts</li> <li>3. Students will be able to write program which uses conditions to choose which command to run</li> <li>4. Students can write a program which creates an output using an input</li> <li>5. Students will be able to write a program using loops to repeat tasks in a program</li> <li>6. Students will be able to write programs that execute two or more instructions in parallel</li> <li>7. Students will be able to write a program that will store data in a variable</li> </ol>
Student will be able to debug faulty programs/code according to their grade level	<ol style="list-style-type: none"> <li>1. Students will be able to debug the faulty programs (find mistakes in programs and correct them) given by the teacher</li> </ol>	<ol style="list-style-type: none"> <li>1. Students will learn to debug their own code and code of their peers (find mistakes in their own code and code of their peers and correct them)</li> </ol>

Students will be able rearrange the sequencing and remixing of codes according to their grade level	1. Students will be able rearrange the sequencing of codes which they wouldn't have normally be able to write from the beginning	1. Students will learn how to re-use or remix other people's code to create their own project
Students will learn to iterate in their project according to their grade level	1. Students will be able to improve their projects by receiving feedback from their teachers	1. Students will be able to improve their projects by receiving feedback from their peers and teachers 2. Students will be able to give feedback on their peers' and teachers' work
Students will be able to recognize different problem solving patterns		1. Students will be able to recognize different patterns used in solving problems through various offline activities
Students will learn to abstract and decompose blocks of codes that execute a specific function.	1. Students will be able to decompose the tasks given to them and implement it in Scratch	1. Students will be able to decompose the tasks given to them and implement it in Scratch 2. Students will learn to identify different blocks of code that execute a specific function and use it repeatedly

## Digital Citizenship

Terminal Competencies	Grade 4 (learning outcomes)	Grade 5 (learning outcomes)
Students will learn to properly manage and protect their personal information in the internet	1. Students will learn the importance of creating strong passwords and how to create strong passwords 2. Students will learn about why websites want their information and what information can be given	
Students will learn what information to share and what not to share in the internet	1. Students will learn what information to share and what not to share but in private and public domains	
Students will learn to identify and differentiate fake and valid source of information in the internet		1. Students will be able to identify fake videos/news 2. Students will be able to identify valid source of information for their assignments
Students will learn how to search information in the internet		1. Students will learn how to search information in the internet
Students will be able to use		1. Students will be able to use and

and attribute information		attribute information in their assignments
---------------------------	--	--

## Design and Visual Communication

Terminal Competencies	Grade 4 (learning outcomes)	Grade 5 (learning outcomes)
<p>Students will learn how to use a real world digital design tool</p> <p>Students will learn to receive and provide feedback on their design using design principles taught at grade level</p>	<ol style="list-style-type: none"> <li>1. Students will learn about an open source vector graphics tool inkscape</li> <li>2. Students will learn basics of inkscape like drawing and manipulating shapes, filling color etc</li> </ol>	
<p>Students will be able to conduct a digital survey to collect data</p>		<ol style="list-style-type: none"> <li>1. Students will be able to conduct a digital survey to collect data</li> </ol>
<p>Students will demonstrate an understanding of design principles accordingly to their grade level</p>	<ol style="list-style-type: none"> <li>1. Students will learn to create infographics representing available data sets</li> <li>2. Students will demonstrate an understanding of design principles like balance, closure, typography and hierarchy</li> </ol>	<ol style="list-style-type: none"> <li>1. Students will learn different concepts of color theories and apply them in their design</li> </ol>
<p>Students will learn to receive and provide feedback on their design using design principles taught at grade level</p>	<ol style="list-style-type: none"> <li>1. Students will learn to receive and provide feedback on their design using design principles like balance, typography, closure etc</li> </ol>	<ol style="list-style-type: none"> <li>1. Students will learn to receive and provide feedback on their design using design principles like color theories</li> </ol>

## Grade 4 Computing Curriculum Career and Motivation

Terminal Competencies	Learning Outcomes	Planned Activities	Remarks
Students will learn about skills required for professionals in the tech industry	Students are aware that coding / programming is essential skill to build new technologies	Interview of Ayush Subedi, Chief Technical Officer at Tootle on how he uses coding to develop the app	
	Students will be aware of South Asian (with emphasis on their home country) coders and South Asian coding companies	Interview of Ayush Subedi, Chief Technical Officer at Tootle on how he uses coding to develop the app  Interview of Amogh Dhakwa, Freelance designer on how he became a designer and what skills are needed to be a designer	
Students will learn about a case study of how TMPI applies to a simple piece of technology	Students will learn about a case study of how TMPI applies to a simple piece of technology	The evolution of the idea of Tootle from tracking public transport to a ride sharing app  Students will come up with an idea of their own app receive feedback and modify their idea	

## Computational Thinking

Terminal Competencies	Learning Outcomes	Planned Activities (Scratch)	Remarks
Students will be able to write simple algorithms for simple tasks and implement them according to their grade level	Students will be able to test a program that they wrote using their own prediction	<b>10 block activity</b> Students write a code using only the given 10 blocks	The objective is more to familiarize with the scratch interface
	Students will be able to understand the code written by their peers and predict what they do	<b>Tinkering with games in Scratch Community</b> Students will play the games available in the Scratch community. Predict which block of codes do what and try to make changes in the codes to see	
	Students will be able to write a program using loops to repeat tasks in a program	<b>Making a greeting card</b> Students will make their own animated greeting card	
	Students will be able to write programs that execute two or more instructions in parallel	<b>Animating your sprite</b> Students animate multiple sprites at the same time learning about parallelization  <b>Making your Dance Video</b> Final project for the students	
	Students can write a program that take an input from the user to trigger certain set of events	<b>Making your Dance Video</b> Students will share their dance videos (complete or in progress) and students will give feedback on it and then they go about improving their video  <b>Specific Short Challenges for Students</b>	



Student will be able to debug faulty programs/code according to their grade level	Students will be able to debug the faulty programs (find mistakes in programs and correct them) given by the teacher		
Students will be able to rearrange the sequencing and remixing of codes according to their grade level	Students will be able to rearrange the sequencing of codes which they wouldn't have normally be able to write from the beginning	<b>Tinkering with games in Scratch Community</b> Students will play the games available in the Scratch community. Predict which block of codes do what and try to make changes in the codes to see	
Students will learn to iterate in their project according to their grade level	Students will be able to improve their projects by receiving feedback from their teachers	<b>Making your own Dance Video</b> Students will share their dance videos (complete or in progress) and students will give feedback on it and then they go about improving their video	
Students will learn to abstract and decompose blocks of codes that execute a specific function.	Students will be able to decompose the tasks given to them and implement it in Scratch	<b>Specific short challenges for students</b>  ?????	

### Digital Citizenship

Terminal Competencies	Learning Outcomes	Planned Activities	Remarks
Students will learn to properly manage and protect their personal information in the internet	<ol style="list-style-type: none"> <li>1. Students will learn the importance of creating strong passwords and how to create strong passwords</li> <li>2. Students will learn about why websites want their information and what information can be given</li> </ol>		
Students will learn what information to share and what not to share in the internet	<ol style="list-style-type: none"> <li>1. Students will learn what information to share and what not to share but in private and public domains</li> </ol>		

### Design and Visual Communication

Terminal Competencies	Learning Outcomes	Planned Activities	Remarks

Students will learn how to use a real world digital design tool	Students will learn about an open source vector graphics tool _____		
Students will learn to receive and provide feedback on their design using design principles taught at grade level	Students will learn basics of _____ like drawing and manipulating shapes, filling color etc	<p><b>Replicating simple figures</b> An activity to get them to draw things like penguins using different shapes is a good way to get them familiar with the tools</p> <p><b>Free play</b> Give students some time to create their own designs using basic shapes and colors</p> <p><b>Filling the poster template</b> Give students to color different poster templates. Task them to evoke certain emotions through the color combination. For e.g How do you evoke festival feel in a Dipawali poster through using different color combination?</p>	
Students will demonstrate an understanding of design principles accordingly to their grade level	Students will learn to create infographics representing available data sets	<p><b>Creating an infographics</b> Students will create a cool infographic on the favorite food in the class on paper and try to replicate it digitally</p>	
	Students will demonstrate an understanding of design principles like balance, closure, typography and hierarchy	<p><b>Critiquing famous posters</b> Students are shown popular posters e.g. a coca cola billboard or the movie poster of Jurassic Park, and the class discusses about different design principles used in the poster.</p> <p><b>Creating your own typographical stickers</b> Students create their own stickers primarily using texts. They play around with different fonts and arrangement</p>	
Students will learn to receive and provide feedback on their design using design principles taught at grade level	Students will learn to receive and provide feedback on their design using design principles like balance, typography, closure etc	<p><b>Giving feedback on your friends' work</b> Students will have to share their work at every stage and their friends constantly give feedback on their work. Teachers should encourage the feedback covering the concepts that they have learned in class</p>	This is something that should be encourage at the end of every activity

## Grade 5

### Career and Motivation

Terminal Competencies	Learning Outcomes	Planned Activities	Remarks
Students will learn about the skills required for professionals in the tech industry	Students will learn about the diversity of skills required in the tech industry (designers, coders, managers etc)	Interview with an engineer in Facebook	
Students will learn about a case study of how CT applies to a simple piece of	Students will learn about a case study of how CT applies to a simple piece of technology	<p>Interview with an engineer in Facebook</p> <p>Interview with Kreeti Shakya (Designer</p>	

technology		<p><b>and Founder of Kazi Studios)</b> It's about Kreeti talking about how designing and visual communication is essentially problem solving</p> <p>Students solve a problem presented to them through application of CT</p>	
------------	--	--	--

### Computational Thinking

Terminal Competencies	Learning Outcomes	Planned Activities (Scratch)	Remarks
Students will be able to write simple algorithms for simple tasks and implement them according to their grade level	Students will be able to write pseudo codes of programs they want to implement	<p><b>Pen down activity</b> Students will write algorithms/pseudo codes on how to draw different shapes like rectangle, square and circle. They will then proceed to implement them in scratch using the pen down option.</p> <p><b>Make your orange juice</b> Students will watch a video explaining algorithm. Students are divided into groups of 4 where 1 person acts as a computer and 3 of them will have to write a pseudo code to get her to perform simple tasks like making an orange juice</p>	<p>We encourage teachers to come up with their own activities</p> <p>Covers Algorithmic thinking</p>
	Students will be able to write an algorithm by breaking down a big problem into smaller parts	<p><b>Tangram activity</b> Students make different structures/shapes using a combination of different shapes</p>	Covers Decomposition
	Students will be able to write program which uses conditions to choose which command to run	<p><b>Maze game:</b> Students will create a maze game. The character will have to go back to starting position if it touches the borders of the maze, and the game will end once the character reaches the end point.</p> <p><b>Catch game:</b> Students will create a catch game. They will create a game that catches falling objects and integrate scores and lives in the game.</p>	Students will have to use conditionals to complete the task
	Students can write a program which creates an output using an input	<p><b>Interactive story building</b> Students make stories that include conversations, or inputs from users.</p> <p><b>Quiz</b> Students make an interactive quiz game</p>	Input/Output
	Students will be able to write a program using loops to repeat tasks in a program	<p><b>Catch game:</b> Students will create a catch game. They will create a game that catches falling objects and integrate scores and lives in the game.</p>	Conditionals Loops/Repetition Variables
	Students will be able to write programs that execute two or more instructions in parallel	<p><b>Race game:</b> Students will create a race game with 2 or more characters.</p>	Parallelization
	Students will be able to write a program that will store data in a variable	<p><b>Catch game:</b> Students will create a catch game. They will create a game that catches falling objects and integrate scores and</p>	Conditionals Loops/Repetition Variables

		lives in the game.	
Student will be able to debug faulty programs/code according to their grade level	Students will learn to debug their own code and code of their peers (find mistakes in their own code and code of their peers and correct them)	<b>Debug your friend</b> Students will be paired in the group of two. They will have to write a faulty code to give to another peers. Students will debug their friends' code.	
Students will be able rearrange the sequencing and remixing of codes according to their grade level	Students will learn how to re-use or remix other people's code to create their own project	<b>Remixing from Scratch Community</b> Students will pick a game from the Scratch Community and add their own features to the game.	
Students will learn to iterate in their project according to their grade level	Students will be able to improve their projects by receiving feedback from their peers and teachers	<b>Making your own Computer Game</b> Students will share their games (complete or in progress) and students will give feedback on it and then they go about improving their game	
	Students will be able to give feedback on their peers' and teachers' work	<b>Make your own Computer Game</b> Students will share their games (complete or in progress) and students will give feedback on it and then they go about improving their game	
Students will be able to recognize different problem solving patterns	Students will be able to recognize different patterns used in solving problems through various offline activities	<b>Parity Activity:</b> Teachers can introduce the concept of recognizing patterns to solve problems through the offline <a href="#">Parity Magic Trick</a> . Teachers can demonstrate the parity trick and get students to figure out how it works. After the students figure the trick out, you can get students to repeat trick  Option 2	Students will have to recognize the patterns of odd numbers or even numbers and have to identify odd one out  Pattern Recognition
Students will learn to abstract and decompose blocks of	Students will be able to decompose the tasks given to them and implement it in Scratch of		
	Students will learn to identify different blocks of code that execute a specific function and use it repeatedly	Option 1 7 line activity	

### Digital Citizenship

Terminal Competencies	Learning Outcomes	Planned Activities	Remarks
Students will learn to identify and differentiate fake and valid source of information in the internet	<ol style="list-style-type: none"> <li>Students will be able to identify fake videos/news</li> <li>Students will be able to identify valid source of information for their assignments</li> </ol>		

Students will learn how to search information in the internet	1. Students will learn how to search information in the internet		
Students will be able to use and attribute information	1. Students will be able to use and attribute information in their assignments		

### Design and Visual Communication

Terminal Competencies	Learning Outcomes	Planned Activities	Remarks
Students will be able to conduct a digital survey to collect data	Students will be able to conduct a digital survey to collect data	<b>Creating an online survey</b> Students will learn to create an online survey using tools like google forms or survey monkeys and then collect data online	
Students will demonstrate an understanding of design principles accordingly to their grade level	Students will learn different concepts of color theories and apply them in their design		
Students will learn to receive and provide feedback on their design using design principles taught at grade level	Students will learn to receive and provide feedback on their design using design principles like color theories		