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Video content creation as an enhancement to learning experiences about sustainable development in Indian elementary schools

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ABSTRACT

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Digital video creation is an emerging technology that can be used in education to support, extend, measure, or change learning outcomes. Student generated videos have the potential to open a new realm in education, where children are no longer just learners but also creators of content which can also be used by others to learn. In learning, classifying the video creation phases as response, reflection and tutorial videos to a concept learned by the student helps teachers to understand the efficacy of the leaning that has take place with the student. In this paper, we review relevant literature in this area and outline results from a recently completed research study that investigated the use of student-generated digital video projects in a school in Kerala, India among Grade 7 and Grade 8 children. Findings indicate a range of learning outcomes and pedagogical approaches in use. While most of our findings support existing literature, there was less evidence of conceptual understanding of curriculum topics in our study, and a greater emphasis on audience as a key factor.

Keywords: Education, video creation. Learning enhancements, elementary school education

Table of Contents

LIST OF TABLES	6
LIST OF FIGURES	7
1 INTRODUCTION	8
1.1 Objectives of the study	9
1.2 Relevance of the study	9
1.3 Structure of study	10
1.4 Implementation steps of the study	11
2 THEORETICAL BACKGROUND	12
2.1 Key Concepts	12
2.2 Consumers to creators	12
2.3 Relevant theories.....	13
3 METHODOLOGY	18
3.1 Research Study.....	18
3.1.1 Course linked to the study	18
3.2 Data Collection	19
3.2.1 School	19
3.2.2 Data collection Method	19
3.2.3 Evaluation Method.....	20
3.2.4 Ethics concerns	21
3.2.5 Video Creation Guide.....	23
3.3 Data Analysis	25
3.3.1 Survey Questions	25
4 FINDINGS	28
4.1 Survey Results	28
4.2 Responses to open-ended questions.....	31
4.2.1 Sample responses from the target group	31
4.2.2 Sample Responses from the control group	32
4.3 Project Responses	33
4.3.1 Target Group responses.....	33
4.3.2 Control Group Responses	34
5 DISCUSSION	36
5.1 Course Objectives	36
5.1.1 Focus points of the course.....	36

5.1.2	Learning Process	37
5.2	Survey Feedback.....	37
5.3	Project Feedback.....	39
5.4	Interpretations	40
5.5	Limitations	41
5.6	Recommendations.....	41
6	CONCLUSION.....	43
7	REFERENCES	44

LIST OF TABLES

Table 1	Results of the Question 1 in Group 2
Table 2	Results of the Question 5 in Group 2

LIST OF FIGURES

Figure 1	Three purposes of the Usage of Video as suggested by (Schuck and Kearney (2004))
Figure 2	Valuable learning outcomes from student-generated video production.
Figure 3	The feedback form sample of how the data was collected.
Figure 4	Details of how the study was conducted.
Figure 5	Pre-Survey result of the survey about the course in General from the control groups.
Figure 6	Post Survey result of the survey about the course in general from the control groups.
Figure 7	Pre-Survey result of the survey about the course in General from the Target groups.
Figure 8	Post Survey result of the survey about the course in General from the target groups.
Figure 9	Student video: 20200201308049
Figure 10	Seminar Video: Student Id: 20200201308060
Figure 11	Student Id :20200201307056
Figure 12	Student Id: 20200201307064
Figure 13	Screen grab from video presentations Student id: 20200201308034

1 INTRODUCTION

With the growing influence of video sharing and video creation apps, sharing of information world-wide using video has become a more common and easy task even for the general public. Earlier, video content creation for interviews of key people, or demonstration videos were reserved to large institutions or news agencies which had enough capacity and resources. Currently with the availability of phones and mobile devices which can take high quality videos and record good audio, the making of videos have become a very common practice in the daily life of adults as well as children. Moreover, learning new skills referring to a video tutorial, for example in video sharing platforms like YouTube, Tiktok and Vimeo has become a common practice. This paper explores the possibility of introducing video creation as a learning instrument for young children. As phone usage has become very common and creation of videos or the new career aspiration of young children called YouTubers have taken a common place exploring a method like this seems very important in the coming years the skills required for video creation seems to be something of a basic knowledge that children have from a very young age.

It is with this understanding that the author of the paper took up this subject to do research on whether the idea of creating a video relating to concepts in school content can help children to better understand those concepts.

The focus of this paper is on the learning outcomes of a group of children aged 12 to 14, in an elementary school in Kerala, India. The groups of students in the 7th and 8th grade were given an opportunity to study a self-paced course on waste management and sustainability. The children did the course over a period of 4 to 6 weeks under the guidance and under constant follow up by the mentor teachers and the project coordinator from the organization conducting the course.

The course especially focused on teaching children the scale of the waste management challenges and how they can make changes in their lifestyle to bring about change. The course generally was action and activity oriented.

The students were asked to create a project at the end of the course. This was done specially to showcase the changes they have bought in their life and the learning that they had as part of the course either as an awareness, action, or implementation oriented tangible project. The final project delivery was split into two groups where in one target group was given specific instructions about the best practices on how to create a video. The focus of the study was to assess from the pre-

and post- project responses of the students whether creating videos about concepts they have learned enhanced their learning experience.

1.1 Objectives of the study

The main question that we are trying to answer with the help of this research paper is as follows: “can video content creation on a specific topic enhance the learning experience of the learner?”

To summarize, the key question asked here is, when a learner is given the task to understand the key concepts about a specific topic, would creation of a video enhance the efficacy of the learning process. These could include results of surveys about the understanding of concepts, verbal feedback about the learning associated with a project work or similar demonstration of some sort which would explain their understanding of a specific topic or in any other related content.

The key objectives of the research can be summarized as follows:

1. Whether video creation on a specific subject and creating content like practical demonstration of concepts, covering problems related to the subject, interviewing others who are already experts in the field can help the learner have better understanding of the topic; and

2. Second important thing that we are trying to understand is whether students already have the skills for video creation or such an initiative and how easily they were able to do the video creation, which is also one of the assumptions grounding the research paper.

The study does not require the participating children to write a specific question paper-based examination but rather to observe inputs, about the understanding of a certain subject before and after the video creation exercise. This paper will also explore specific incidents or ideas that came up during the process of video creation, which would have influenced the children's learning process or the understanding of the subject.

1.2 Relevance of the study

The pandemic in the year 2020-2021 has been a year when new educational technologies have emerged to solve the challenge of not being in class due to social distancing. In many countries,

online and distance learning has become a very common practice. Many countries have taken more practical solutions like projecting the study material and classroom session over radio and TV channels. The focus has been on delivering the study materials to the children initially, but the efficacy of the learning done in this way is yet to be fully studied.

One possible reason for the apparent slow uptake is also the high costs historically related to accessing a category set of digital cameras, sufficient digital space for storing, and computers powerful enough for post-production. A second reason for the slow integration of student-created digital video is also the requirement for teacher training. As cited in one of the publications from 2010, the authors of the paper clearly state an explanation which formed a barrier to adopting the use of student created video. As stated, these reasons have eroded over the last decade and the author feels a study which addresses digital content creation for enhancing learning is relevant more than ever (Henderson et al, 2010).

1.3 Structure of study

This paper it will explore whether the learning outcomes of participating children were any different based on the final activity they had to do as part of the course of sustainability and waste management. Data is collected relating to key concepts about learning which the children can gain by using videos over other mediums. Relevant theories and associated results of the studies will also be evaluated..

Methods and processes followed in doing the study will also be presented. The text will also outline in detail how the data was collected and analysed. The Likert scale that was used to represent the data based on the responses and its significance in such a study will also be discussed before we look at the findings in general.

Findings relate to survey results, the verbal feedback given by the students as well as the video and non-video projects to look at for pointers on how the efficacy of the program is different based on the path taken.

Findings from the study will then be discussed by looking at different examples of responses and projects submitted by the students in each group. We will be looking at clues where the children would be showing signs of the different types of learning experiences that we had discussed in the

theories and background session. The study will try to uncover and conclude on the presence of any relevant difference in the learning outcomes based on the path taken by the children in the learning journey.

1.4 Implementation steps of the study

There is the important question of how the courses developed by VentureVillage find their way in the education system of the developing world. This is attained by associating with the school system and collaborating with them to implement this course as their co-curricular activity for their students. Schools belonging to different educational boards, State syllabus schools, Central Board of Education (CBSE) and Indian Certificate of Secondary Education (ICSE) have associated with the organisation to adopt the GreenCity course as their co-curricular element.

The course has also been developed in English and in the state language Malayalam so that the content finds its way to a maximum number of students without the restrictions caused by language barriers. VentureVillage has currently partnered with researchers from the Max Planck Institute, Munich for the GreenCity course. Through this partnership, the institute acts as the funding partner for implementing the course in a certain number of schools in Kerala.

The course used to run offline with VentureVillage course facilitators physically teaching the course in schools prior to the pandemic. The pandemic posed the organisation with the challenging question of how courses could function amidst a global pandemic and schools shifting to the online mode of functioning. This was particularly a challenge given the activity-oriented curriculum and pedagogy involved in this course. However, with the contingencies caused by the pandemic in mind, the course has been completely shifted online without losing the essence of the activity-based curriculum that was initially developed. The offline games and activities have been recently shifted online and is running smoothly as an activity-oriented and fun course that aims at building awareness and growth mindsets in children.

2 THEORETICAL BACKGROUND

2.1 Key Concepts

Based on earlier studies, student created content as a learning instrument is not a new concept. Even in some of the earlier research conducted in the 1990's using analogue video production states positive outcomes in learning when students were engaged in video production (e.g. Tyner, 1994). In the current era, even though the creation and sharing of digital media has become widespread, the usage of video content creation as a learning instrument has not found a place with the educational system. The difficulties which came with analogue video production (like speed of replay, editing, titling and effects, re-usability and sharing) as well as digital video production (like availability of digital cameras, sufficient storage space, computers powerful enough for editing) have now disappeared with the advent of good mobile phones and video editing apps on the phones. Some of the things which were earlier only reserved for movie studios and media agencies are now easily achievable with a mobile phone. Global sharing possibly is also very much within the reach of students who has access to internet. Considering this leap in digital video content creation technology as well as the current situation caused by the pandemic, the teachers' community was in a way forced to adapt and evolve into using student created digital content for evaluating the learning happening with in the classroom.

2.2 Consumers to creators

During a typical day, kids and teens check out YouTube, watch TV, play video games, scroll through social media feeds, and listen to music. Overall, they are passive consumers of the content they love. If you consider giving them the correct ideas and the equipment in an educational context, they can be using this time and effort to build creative skills while sharing their stories, opinions, and ideas. Encouraging students to be more of a creator than a consumer might just be a matter of pointing to someone or something they admire and giving them the technology to make their vision come alive. There are multiple ways in which digital content creation is happening in the current times.

- **Sharing a Story:** Students are naturally story tellers. Giving them an opportunity and a real audience shows that the content that they create can matter, so students in K-12 can use sites and apps where they can share creations. Also, if the students have strong opinions about issues or interesting people in their lives, they can use tools to document and share those stories (Elgersma, 2021)
- **Advanced story telling skills using digital video:** As video content platforms like YouTube and Tiktok is becoming more popular with students, children love to combine different aspects of a story to create a movie which tells a story from many different perspectives. To share those stories, they can play around with animated storytelling apps which are quite popular, which will let them record a mini movie with movable characters, props, and settings (Elgersma, 2021).
- **Showcasing their work or talent:** Not so much different from sharing a story, students can create content based on their interest to show case their work. This could be as varied creating art, doing crafts, doing science experiments, cooking, or baking etc and documenting using it in a digital video which could be shared. This will give them more confidence to try out new things in what they are passionate about (Elgersma, 2021). Similarly, if the students have an ear for music, then can perform some tracks, they can record, edit, and share their stuff.
- **Gaming and video streaming:** Children play games for hours on their computers or gaming consoles. Video documenting their gameplays using live streams using platform like twitch, Facebook game and YouTube is becoming a popular.

2.3 Relevant theories

“Student-created digital video, or student digital video production, refers to the process by which students, either singularly or collaboratively, engage in the activities surrounding the recording of digital video (Henderson et al, 2010, p. 12)”. “Such activities might include directing the camera, storyboarding, scripting, rehearsing, prop manufacture, researching, performing, editing and other post-production. Student created digital video does not necessarily require video recording, since stop-animation or Claymation use a series of static images to make up a video presentation (Henderson et al, 2010, p. 12)”. “Furthermore, students creating video may not even see a digital video camera, instead they could be using digital “still” cameras which can record video or one of the many rapidly developing mobile technologies with digital video recording capability such as mobile

phones or wireless cameras which stream their feed to a computer. Handheld portability is not even a requirement since some productions, as was found in this case study, only require a limited stationary angle. For this purpose, a mobile phone camera would be sufficient (Henderson et al, 2010, p. 12)". Schuck and Kearney (2004) proposed that there are three purposes, which they refer to as Modes, for student-generated digital video:

1. Mode 1: digital video used as a communication tool to facilitate students' communication of a message, idea, or Information.
2. Mode 2: digital video used as an observation and analysis tool to enhance students' observation and analysis of performance or phenomena
3. Mode 3: digital video used as a reflection tool to support students' reflection on their own learning.

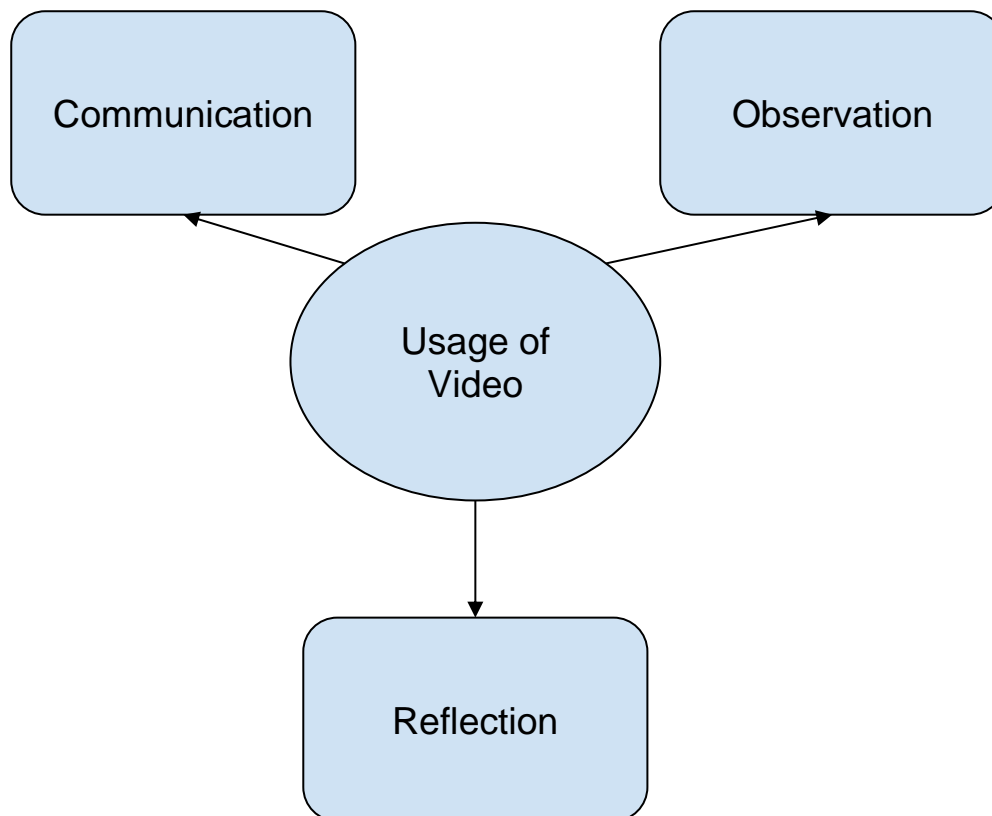


Figure 1: Three purposes of the Usage of Video as suggested by (Schuck and Kearney, 2004)

In their case study analysis of five schools, Schuck and Kearney (2004) noted that although Mode 3 is potentially the most powerful in terms of learning outcomes it was the least represented. Nevertheless, in their case study analysis of five schools they reported a number of valuable learning outcomes from student-generated video production:

1. Movie making skill development and related language development: Storyboarding, film techniques, editing, publishing etc. and use of associated jargon
2. Literacy skills: Including media, visual cultural and critical literacies
3. Communication and presentation skills: Oral, written, reading, listening, visual. Acting skills. Interviewing skills
4. Organisational and teamwork skills: Organizing and planning skills; managing, leadership, negotiation, and social skills.
5. Higher-order thinking skills: Problem-solving, reasoning, planning, analysing, creating, and questioning skills.
6. Metacognitive skills: Becoming aware of how one learns; reflects on own learning.
7. Affective skills: Enhancement of self-esteem; risk taking; value of subject, appreciation of films; care of equipment, responsibility. (Schuck & Kearney, 2004, p. 82)

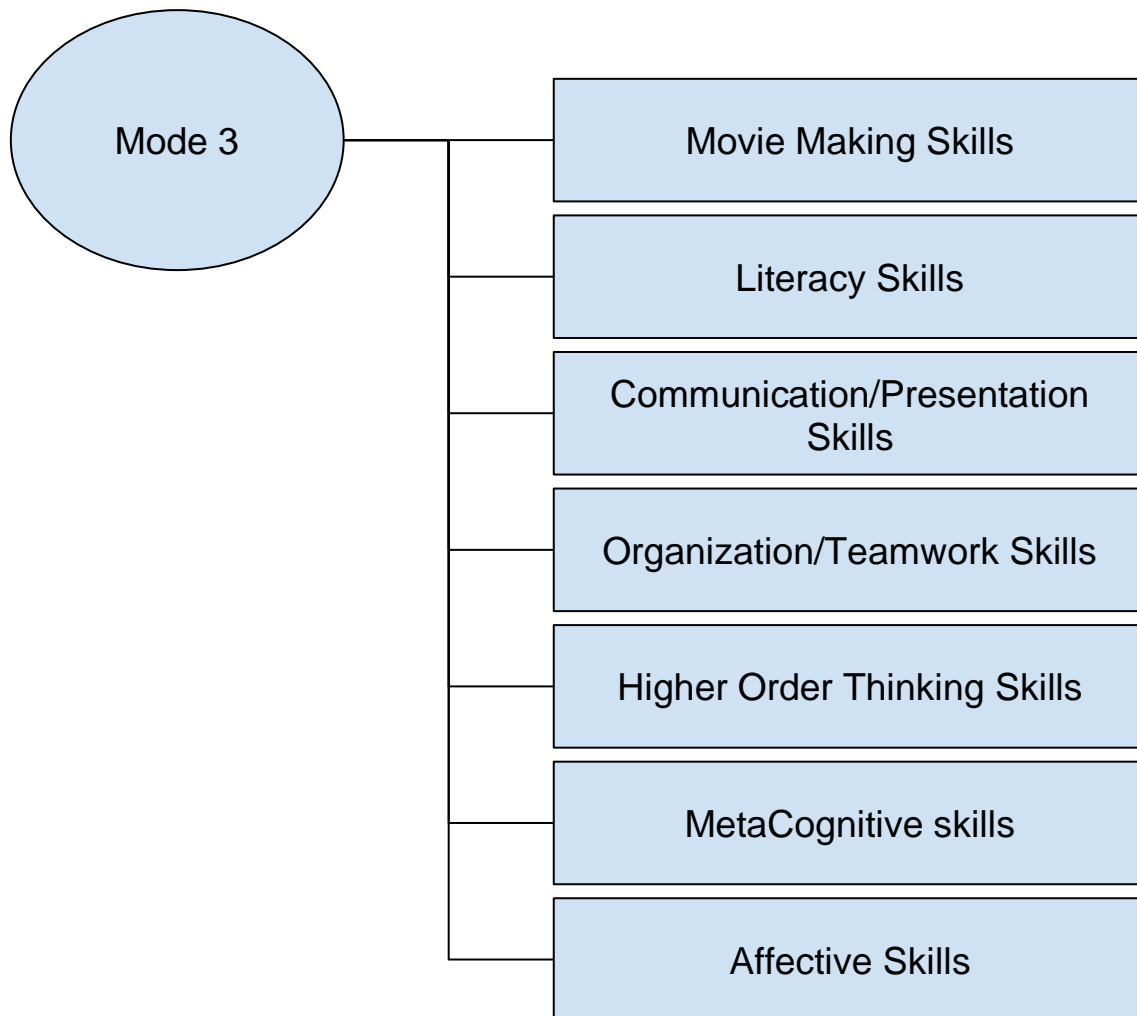


Figure 2: Valuable learning outcomes from student-generated video production.

Schuck and Kearney (2004) also note that students did demonstrate learning of concepts specific to the curriculum but that it was relatively low compared with the other learning outcomes. Reid, Burn and Parker (2002) conducted a large-scale study of 50 schools in the United Kingdom and found that digital video production supported a range of learning styles including kinaesthetic, spatial, musical and verbal. They also reported increased development of skills such as problem solving, negotiation, reasoning and risk-taking. “However, they also warned that the integration of DV technologies into subject teaching does not automatically improve the quality of work or standards of attainment; high quality teaching remains the key factor in raising achievement (Reid, et al., 2002, p. 3)”. The pivotal role of the teacher in facilitating effective learning outcomes is also advocated by Schuck and Kearney (2006) and Hofer and Owings-Swan (2005).

Although the research literature is not prolific, especially in the early childhood and primary contexts, there is sufficient evidence to suggest that engaging students in the production of digital video

can support teachers' educational objectives (See Schuck, Sandra & Kearney, Matthew, 2006). The principals were invited to showcase their school by participation in the research project. It was explained that the project would, through observations, interviews and discussions explore the ways that computers, the Internet, and other technologies had been harnessed to support learning and teaching in the school. At prearranged times researchers visited each school over a three-day period and conducted interviews with the principal, teachers, students, and parents; as well as conducting classroom observations and perusing policy documents, teaching materials and student work samples. Video and audio recordings of teachers were also collected to help construct a series of web-based multimedia case studies called "digistories". The purpose of the digistories was to provide other practitioners and researchers a rich thick description of the strategies employed as well as an in-depth analysis of those strategies. For a detailed discussion of the project methodology including school selection, data collection and coding scheme see Holkner, et al. (2008) and for a critical discussion of the concept of exemplar schools see Auld, et al. (2008).

3 METHODOLOGY

3.1 Research Study

The study conducted is based on data collected as part of surveys conducted pre- and post-course projects. The survey includes questions and answer choices with Likert-type scales as well as two free text single line input options. The group was split between a control group and target group in which the target group was given further instruction on project creation using video while on the other hand the control group received no special instructions. This study was conducted together with an online course on waste management and sustainability involving 140 children in two grades in the identified school. Through this study, both quantitative data from the Likert-Type Scales and qualitative data from the free text fields were collected as well as the project work results in the form of photos, videos etc.

3.1.1 Course linked to the study

The online course used as part of this study is named GreenCity Online and is a course run by an organization named VentureVillage Learning solutions in schools in the developing countries. The overall objective of the course is to support students of ages 12 and above to become more environmentally aware and responsible citizens. This course has been done at the time of writing this publication in about 25 school and has been attended by around 3500 children in total. The course is a self-paced video driven course for children which includes games, puzzles, and activities through which they learn important concepts. The program is structured in a way that the children must do an activity or a project at the end of a few chapters and upload their work into the educational platform. As part of this study, after completing 80 percent of the course the students were split as two separate groups and each given a different path to do the project work. The control group followed the regular method of project completion, whereas the target group was provided a video creation instruction explicitly and were asked to submit the project.

3.2 Data Collection

3.2.1 School

Global Public School (GPS), Kochi is a co-educational day and residential school affiliated with the Central Board of Secondary Education (CBSE) and Cambridge International Examinations (CIE), UK. With a teacher student ratio of 1:10, Global Public School in Kochi offers a holistic experience which combines academic and co-curricular education. GPS is affiliated to the CBSE and Cambridge International Examinations (CIE), UK. In the junior school (class I to V), a teacher-student ratio of 1:10 allows for personalized tutoring. Continuous and Comprehensive Evaluations (CCE) in the school is as follows. Feedback is regularly given to students and parents through open house, and remedial sessions are scheduled for children who need help. Middle school students (classes VI to VIII) can participate in various cultural and sport activities. Academic achievement and social interaction are the focus (Global Public School, Kochi, 2021).

3.2.2 Data collection Method

The main process that would be followed for the data collection in this specific paper is as follows. The paper would focus on an online course which deals with waste management and sustainability and is being conducted for children in 7th grade and 8th grade in India. The students doing the course were split into two groups. Each control group as part of the course would be given different kinds of exercises and activities as part of the course completion. For a specific control group, video creation activities were handed out while for the other group project report creation on paper was distributed.

Data was collected using pre- and post-course questionnaires and other multiple question surveys to measure students' understanding of particular topics. Based on the pre- and post- course responses and the results of the questions on the topic, it was expected that insight could be gained into understanding whether the video creation process or any other incident during the video creation process influenced the learners learning experience. The learning platform which the children

used to complete the course on sustainability was used to do the data collection. The learning platform itself was a highly customized version of the commonly used, open source Learning Management System (LMS) platform Moodle. The data was collected using a survey mechanism embedded within the tool.

Hello friends. Welcome to a new section in our GreenCity course. As you have finished this course, we would like to ask you a few questions regarding doing a project at the end of the course. The questions are in the form of statements. The questions are in the form of statements. There are 5 answer options for these statements:

- Strongly Agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

If you read a statement and agree with it completely, you can choose the "Strongly Agree" option. But if you think you don't agree with a statement completely, you can choose the "Somewhat agree" option. And if you neither agree nor disagree with the statement, you can choose the "Neither agree nor disagree" option. Similarly, if you read a statement and disagree with it completely, you can choose the "Strongly Disagree" option. But if you think you don't disagree with a statement completely, you can choose the "Somewhat disagree" option.

The statements are:

I understand the contents of a course better if I do a project at the end of the course:

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

If I do a project at the end of a course, documenting all the steps during the project work helps me understand the course content better

- Strongly agree
- Somewhat agree
- Neither agree nor disagree
- Somewhat disagree
- Strongly disagree

Figure 3: The feedback form sample of how the data was collected.

3.2.3 Evaluation Method

At the end of the course, the student group was divided into two groups: one a control group and the other a target group. Both groups were given a Pre-project survey after which they had to create a project. The target group was given an extra set of instructions as described earlier on how to create videos. In the instruction, general best practices were discussed, and simple examples of student generated videos were also presented. The control group went directly ahead after the pre-project survey was completed.

The idea was not to push the children specifically to create a specific type of video but just give them a pointer that they could create videos as well as the project. Both the groups later submitted their project works and completed the Post-project survey of the course

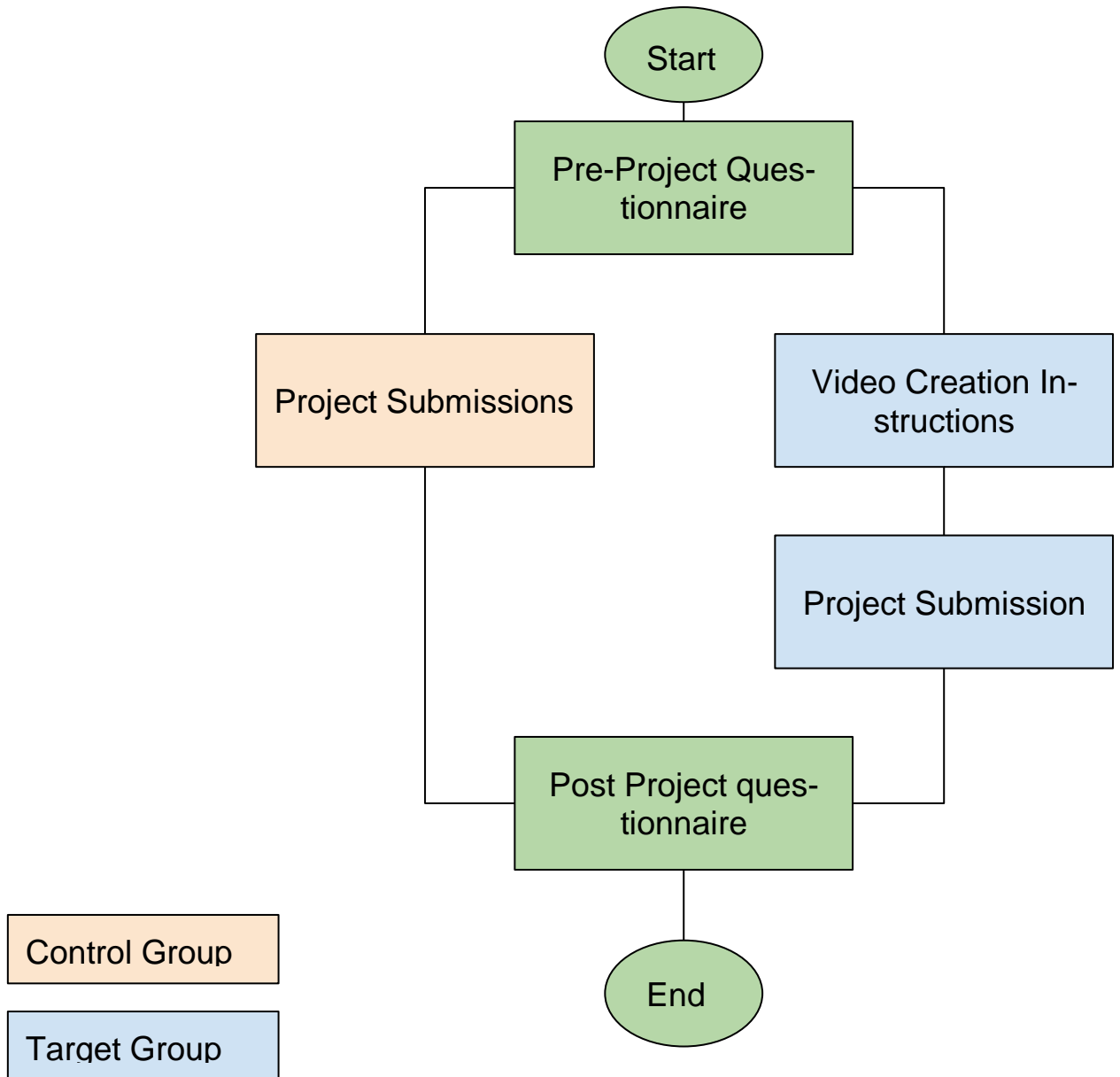


Figure 4: Details of how the study was conducted.

3.2.4 Ethics concerns

Since data was collected about a course completed by children, the following measures were taken to address the privacy and personally identifiable information (PII) data issues.

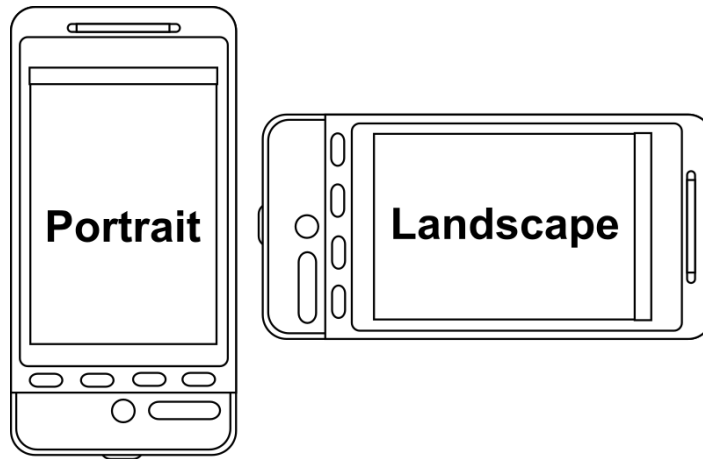
1. Consent forms signed by the school leaders collected before the course was conducted.

2. A consent form distributed as part of the course, which would in plain, understandable English outline how the results of the tests and the survey forms would be collected to understand and measure the learning efficacy of the children during the course.

The following video creation guide was provided only for the target group who were meant to do the final project as a video. They were given clear instructions as a document alone and were supposed to follow it. Best practices, tools, camera orientation etc were shared as part of the document.

3.2.5 Video Creation Guide

1. Be clear about the goal or purpose of the video.
 1. State the goal in simple language at the beginning of the video.
 2. Why are you taking this video and what you want to show in this video?
 3. Title your video based on its goal or purpose.
2. Start with a transcript/Script
 1. Organize your thoughts and create a script so that the way you speak, or your delivery is smooth, and the video is no longer than it needs to be.
 2. If you want, you can also use the transcript to create subtitles.
3. Be concise.
 1. Keep your video to 3 -5 minutes max.
4. Be descriptive.
 1. Avoid generic words (e.g., this, that, there) in favour of more descriptive language.
 2. For e.g.: If you are pointing at something and explaining how it works, please use the name of the object instead of saying “This can...”.
5. Minimize distractions.
 1. Make sure there is very less background noise when you are recording your video.
 2. If there is too much background noise it will be very difficult for people to listen to what you are saying
 3. Please make sure that you are in the middle of the video when talking or the object you are explaining about is in the video.
 4. It is not mandatory for you to appear in the video. It is ok that you talk about the subject and record you voice alone when recording the video.
6. Think about your room’s/surroundings lighting.
 1. Avoid positioning yourself in front of a light source, such as a window or lamp or the sun.
 2. For best results, make sure the light source is coming from the same direction as the camera or off to the side slightly. For e.g.: sun/light is behind the camera when recording yourself talking.
7. Record in landscape mode on your smartphone.
 1. Hold your phone horizontally (landscape mode) before you start recording.
 2. Portrait mode videos will include distracting black bars on the sides when played on a landscape screen (such as a computer monitor).



1. Keep it steady.
 1. Try to keep the camera steady when filming
 2. Use a tripod or some other method to steady your device or camera (a stack of books or a shelf, for example).
 3. Besides being a distraction, shaky video can cause motion sickness.
2. Use a video platform that you know to share the video with us
 1. For e.g.: YouTube is familiar to everyone nowadays. In case you do not want anyone else to see the video you have created you can create it as “Unlisted” and can share the link.
3. Softwares for editing videos
 1. If you are interested to add captions and edit the video, you can use freely available tools or mobile apps.
 2. In Windows you can use windows movie maker or in Mac you can use iMovie
 3. In mobile phone there are many free tools like Kinemaster, Videoshow, Quik etc available
 4. You can always ask your parents or teachers for help, but please remember that the video is your creation, and you should be the one making it.

Some great examples of nicely captured videos

[Sample Video 1](#)

[Sample Video 2](#)

3.3 Data Analysis

The researcher chose the Likert-type scales to assess the effectiveness of the project work done as part of the study. As shown by other previous studies, “assessment of performance after an educational intervention” is best analysed using the Likert-Type Scales. [...] Thus, understanding the interpretation and analysis of data derived from Likert scales is imperative for those working in education research (Analysing and Interpreting Data from Likert-Type Scales. Gail M. Sullivan, MD, MPH Anthony R. Artino Jr, PhD: 2013, p. 541)”.

While understanding the effectiveness of the Likert-Types Scales to analyse data, it is important to understand the challenges while using this scale. As seen in the previous studies, several stages involved in the answering of such a type of question also needs to be understood. There is widespread agreement about the cognitive processes involved in answering questions optimally. Specifically, respondents are presumed to execute each of four steps. First, they must interpret the question and deduce its intent. Next, they must search their memories for relevant information, and then integrate whatever information comes to mind into a single judgment. Finally, they must translate the judgment into a response, by selecting one of the alternatives offered by the question (Krosnick & Presser, 2010, pp. 265–266). “Each of these steps can be quite complex, involving considerable cognitive work. A wide variety of motives may encourage respondents to do this work, including desires for self-expression, interpersonal response, intellectual challenge, self-understanding, altruism, or emotional catharsis (Warwick & Lininger, 1975, pp. 185–187)”.

3.3.1 Survey Questions

Overall, the survey questions consisted of six Likert Scale questions and two single line free text questions in which children were free to answer based on how they please. The questions which were given as part of the survey are mentioned below.

1. I understand the contents of a course better if I do a project at the end of the course?
 - Strongly agree
 - Somewhat agree
 - Neither agree nor disagree

- Somewhat disagree
 - Strongly disagree
2. If I do a project at the end of a course, documenting all the steps during the project work helps me understand the course content better
 - Strongly agree
 - Somewhat agree
 - Neither agree nor disagree
 - Somewhat disagree
 - Strongly disagree
 3. I have learned a lot about the environment and waste management through this course.
 - Strongly agree
 - Somewhat agree
 - Neither agree nor disagree
 - Somewhat disagree
 - Strongly disagree
 4. After completing the GreenCity course, I feel that I can take more environmentally friendly and responsible decisions in my life
 - Strongly agree
 - Somewhat agree
 - Neither agree nor disagree
 - Somewhat disagree
 - Strongly disagree
 5. Doing a project at the end of the GreenCity course helped me develop my skills further
 - Strongly agree
 - Somewhat agree
 - Neither agree nor disagree
 - Somewhat disagree
 - Strongly disagree
 6. Please list the skills that you developed the most during this course
 - _____
 7. The steps I followed while completing this project will help me with my future courses
 - Strongly agree
 - Somewhat agree
 - Neither agree nor disagree
 - Somewhat disagree
 - Strongly disagree
 8. What was one of the most memorable things during the project work which helped you understand the topic better? Please provide short answer

The total number of points on the scale were five. This was to give more options to the students to answer in case there is a tendency to not select extreme results. Also as seen in figure 3 clear instruction and description were included before the survey. These steps were followed to give clarity to the respondents so that the data is more reliable and valid. This is clearly noted in previous studies about designing surveys. "When designing a rating scale, a researcher must specify the number of points on the scale (Likert (1932))". For the ratings to be reliable, people must have a clear understanding of the meanings of the points on the scale. "If the meaning of scale points is ambiguous, then both reliability and validity of measurement may be compromised (Krosnick A.J. and Presser. S. (2009). Question and Questionnaire Design, 264-266)".

4 FINDINGS

The survey results were collected from both the target group and control group both before and after the course related project work. Since this is a self-paced course, there were some drops in the number of responses. The drops were almost similar in terms of numbers in the groups.

In the control group, there were a drop of almost 50% where 86 children started the project survey and post c1 survey was done by only 40 children. In the case of the target group, the results were somewhat similar. The first survey Pre-project survey was completed by around 69 children and the Post-project project survey was done by around 30 children.

4.1 Survey Results

The survey results are shown in the graph below.

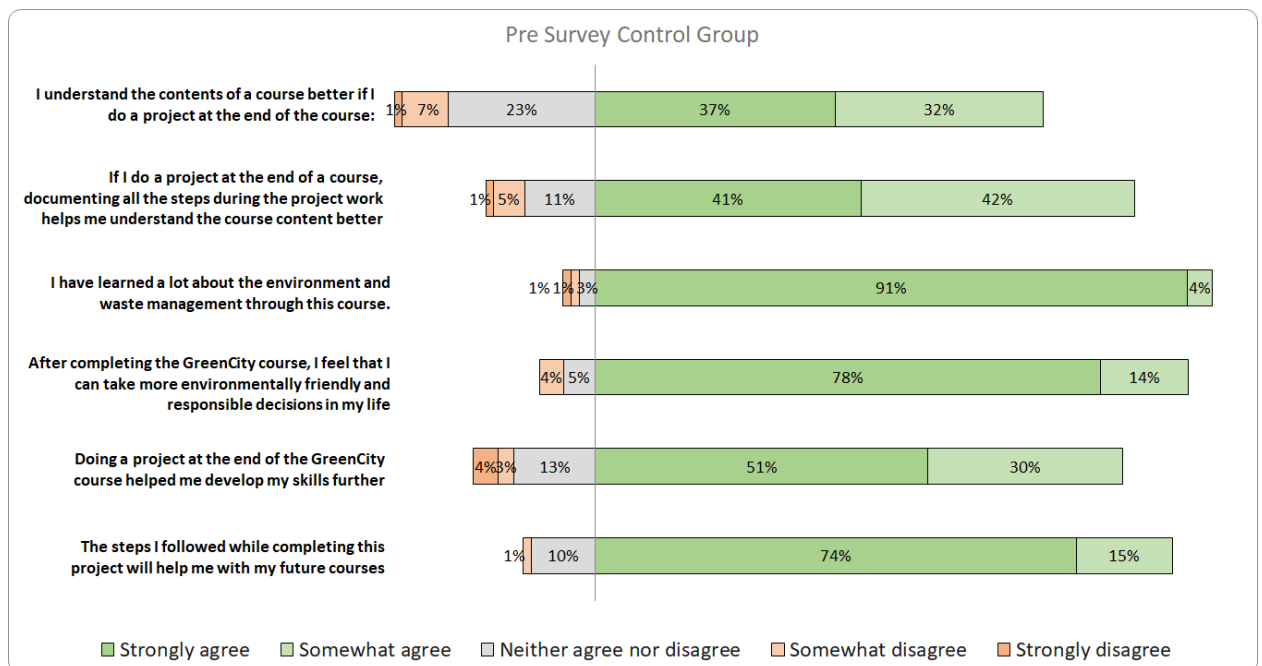


Figure 5: Pre-Survey result of the survey about the course in General from the control groups.

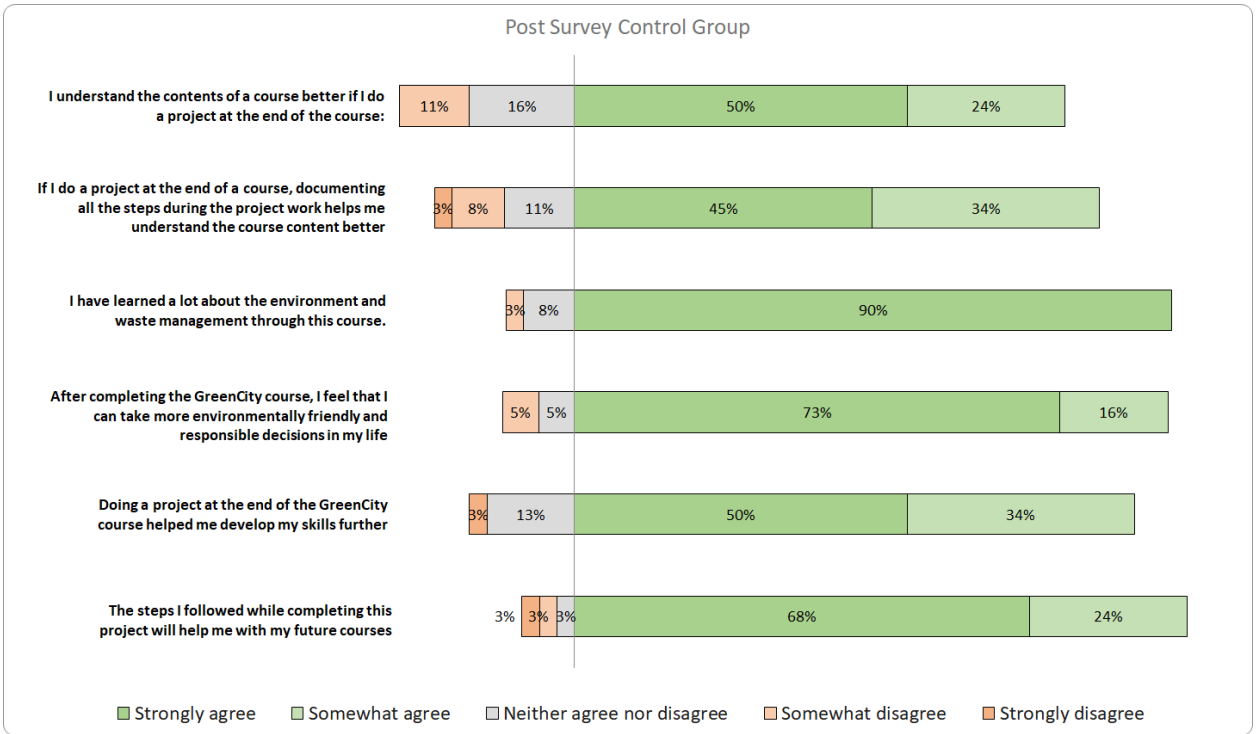


Figure 6: Post Survey result of the survey about the course in general from the control groups

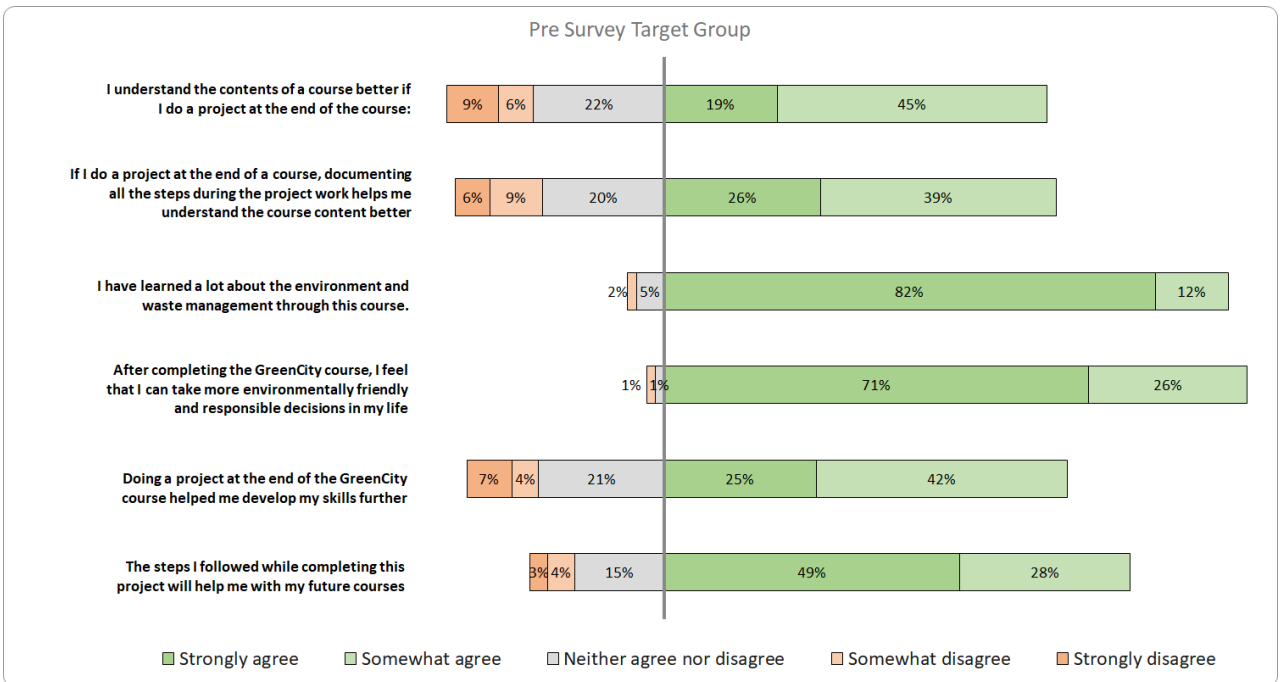


Figure 7: Pre-Survey result of the survey about the course in General from the Target groups.

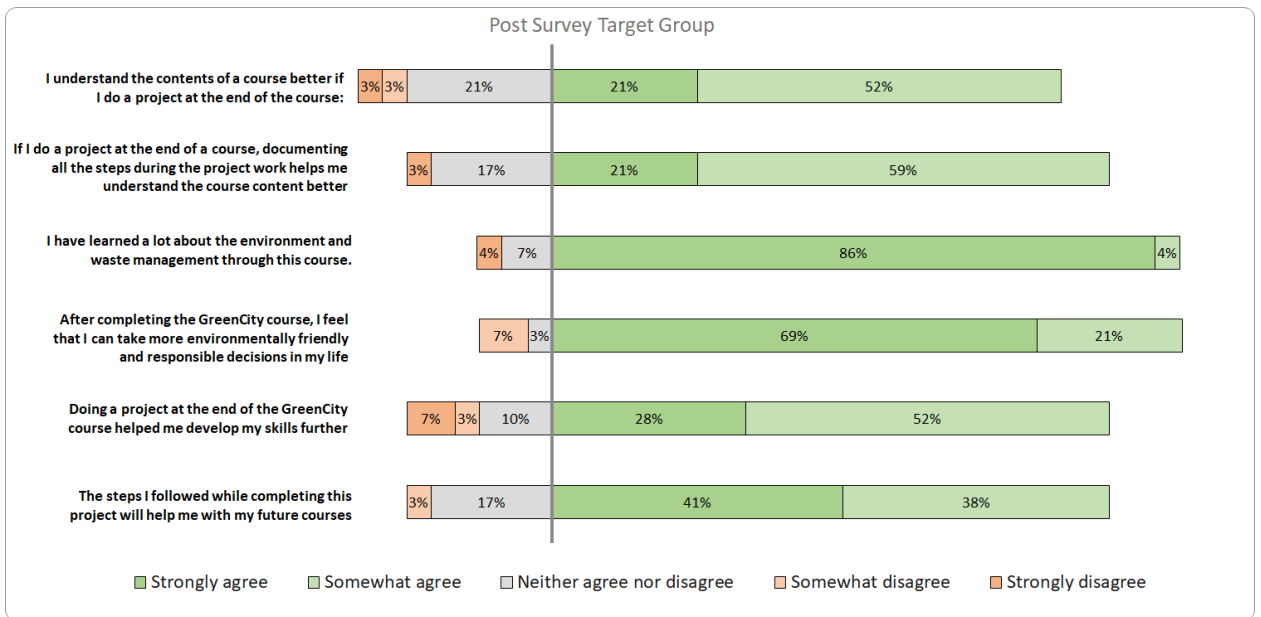


Figure 8: Post Survey result of the survey about the course in General from the target groups.

One of the key indicators explored were the questions and the results of questions 5 and 6. Both questions focused on the project and its corresponding skill development and finding out the intention of whether such a project would help in their future courses. Even though not statistically conclusive, there is a 3% to 13% difference in question number four in the positive responses when considering both groups. For example, the children in the target group who did the video having a change of 13% versus a 3% change in the control group in the positive response towards completing the project. These results suggest that doing a project has improved their understanding or has influenced them to perform better while creating the digital video related project

The negative responses such as 'somewhat disagree' and 'strongly disagree' remained similar in both the control groups in the pre and the post survey.

4.2 Responses to open-ended questions

4.2.1 Sample responses from the target group

The following responses were offered under the question: "What was one of the most memorable things during your project work for the GreenCity course which helped you understand the topic better?"

"making a presentation about the topic helped me organise the topics easier and made the seminar better." (Student Id: 20200201308060)

"I really enjoyed doing the project and explaining the topic helped me understand it better." (Student Id: 20200201308049)

"The research I did during my project helped me understand my topic better. I learned about certain processes involved with my topic and how we can all help do it properly." (Student Id: 20200201308099)

"The fact that even though we are polluting almost everything we have a small chance of good resources left it is nature giving us another chance." (Student Id: 20200201308034)

"Workshop really helped me to understand and learnt about things, I researched a lot on my topic." (Student Id: 20200201308071)

"doing my projects." (Student Id: 20200201308106)

The following responses were offered under the question: "Please list the skills that you developed the most during this course."

Major skills learned.

1. *-segregating and recycling*
 2. *-doing things in a way to reduce plastic*
 3. *-appreciating waste workers*
 4. *-using less non-biodegradable items*
- (Student Id: 20200201308049)*

"Thinking, finding some solutions" (Student Id:20200201308110)

"I have started to recycle and also tell others to do good for nature" (Student Id: 20200201308102)

4.2.2 Sample Responses from the control group

The following responses were offered under the question: "What was one of the most memorable things during your project work for the GreenCity course which helped you understand the topic better? Please provide short answer"

"The project in which I wrote things that I will do in a paper and stick it on a wall, and I started following it too." (Student Id: 20200201307046)

"Doing the project." (Student Id: 20200201307016)

"The most memorable moment during my project was when I tracked the waste in my home" (Student Id: 20200201307073)

"the project helped me to understand all topics mainly the waste management" (Student Id: 20200201307041)

The following responses were offered under the question: "Please list the skills that you developed the most during this course".

*"1.) How to recycle certain waste.
2.) How to manage any kind of waste." (Student Id: 20200201307072)*

*"waste grouping
planting trees and plants
recycling, bottle art" (Student Id:)20200201307023*

"Real-life problem-solving in activities. (Student Id:20200201307020)"

4.3 Project Responses

In this section we can see the responses of the project submitted by the students as part of the course.

4.3.1 Target Group responses

In the target group most of the responses were videos. The videos submitted by the students were either a demonstration of a new skill acquired or a presentation reflecting on the learnings or a video documentation of the changes they have made in their home or locality. As part of the study, we were looking at instances in the video from which we can interpret the student showing some specific characteristic of learning. For e.g., in figure 9, the student created the video with many visual elements which appears on the screen when explaining specific concepts of waste management.

Video reference: <https://www.youtube.com/watch?v=gmrIjVMZ1gs&t=23s>

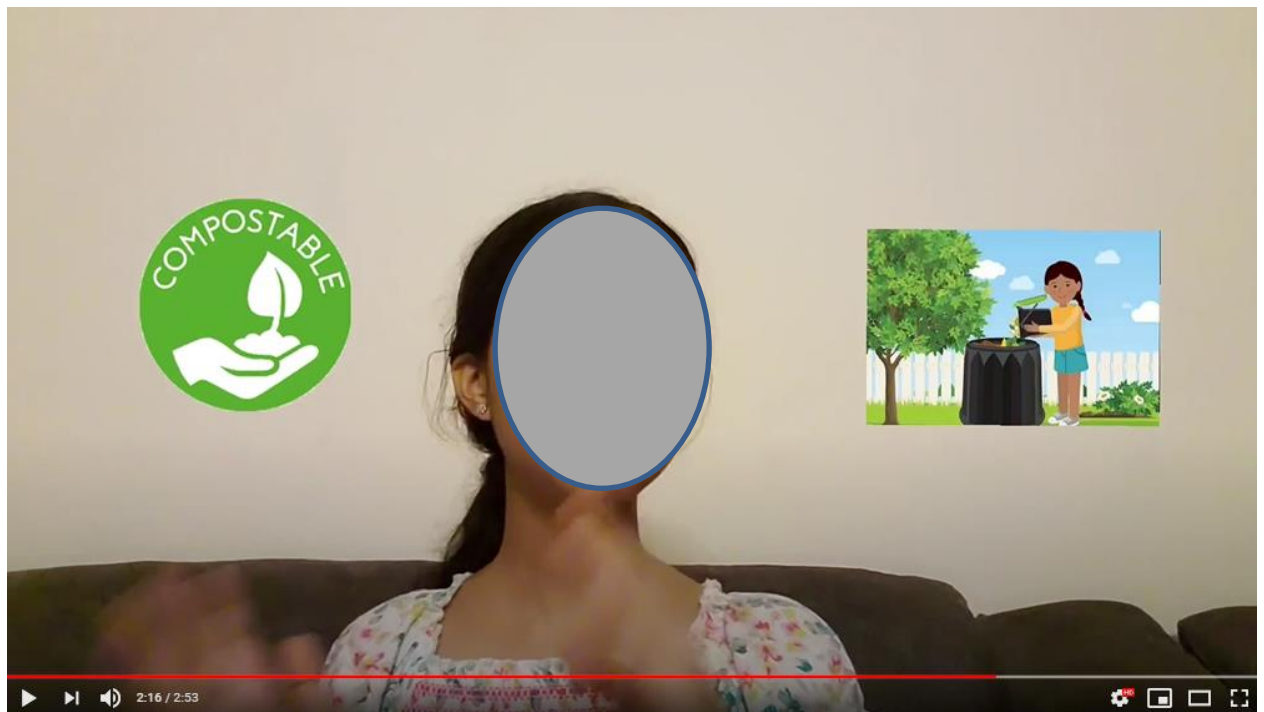


Figure 9: Student video: 20200201308049



Figure 11: Student Id :20200201307056



Figure 12: Student Id: 20200201307064

5 DISCUSSION

5.1 Course Objectives

GreenCity online is an introductory co-curricular course by VentureVillage with the vision of supporting young children to become responsible citizens of the future who are environmentally conscious of their actions. Prior to the onset of the pandemic, the course followed an offline pedagogy which involved VentureVillage faculty visiting schools and teaching this course in person to students. With the onset of the COVID-19 pandemic and the onset of online classes in schools and in the general education system, the course has been shifted to an online format by completely absorbing the essence of the activities and interactions involved in the offline course.

Through the course, students are made aware of the need for good waste management practices and are guided towards developing environmentally friendly behaviour at a young age. This is achieved through a combination of concept-based lectures as well as interactive games and activities. Students are taught about the problems caused by improper management of waste, land, air and water pollution and their consequences on the environment including effects on biodiversity, the importance of individual habit change and their resultant positive impacts and importance of segregation for better waste management. After addressing these concepts, the students are given a brief history of the invention, use and the reasons for popularity of plastics. There is also a chapter dedicated to the comparison of waste management practices in Finland and Kerala.

5.1.1 Focus points of the course

The course primarily focuses on the concept of good waste management practices that would lead towards students transforming themselves into responsible citizens of the future. A responsible citizen is someone, who is aware of issues happening in and around him/her, is deeply concerned about the problem and brings up solutions to address the same by directly involving it. This is a focal point of the GreenCity course which has elements to address each of the required mindsets that would ensure the development of such a responsible citizen. The vision is to also develop important mindsets such as critical thinking, problem solving and design thinking in students from a young age. The course begins with understanding the concept of waste itself and flows on to

concepts such as how it is generated in households and schools, usage of plastics, importance of segregation of waste materials and the same depicted by the videos about the same and so on.

5.1.2 Learning Process

This course on sustainability named GreenCity Online was a self-paced course and was delivered online through the online learning platform of VentureVillage. The children were guided using videos on the topic, chapter by chapter. There were activities and games embedded all along the course. The activities were such that the learners had to note down real-world examples from their locality and upload it to the online platform. A few examples are given below:

1. The children were given a template to copy in which they had to note down the weight of the bio-waste they were generating in their house and project the waste generated over a months and years' time. They were asked to extrapolate that for the whole class and look at the impact that wasting food material can have
2. The children were asked to go around in their neighbourhood to find out pollution hotspots or talk to the responsible people in their locality to talk about the problems in waste management they were facing where they live.

After completing similar activities and games, the children are asked to do a final project as part of the course individually and submit it back as part of the course.

5.2 Survey Feedback

The survey questions were generic. The purpose of the questions was to identify the results and effectiveness, significance of the methods used to do the project and its effectiveness. Some of the points that the survey wanted to check through the questions are mentioned below:

1. The effectiveness of the course and how the course influenced the students (3 and 4)
2. Impact of a project work on the course (1 and 5)
3. Whether the process of doing the project and documenting it was particularly helpful or not (2 and 7)

Looking at the results from the questions in Group 1 about the effectiveness of the course as such, the key learnings from the study was that the efficacy of the program about how effective the course

have been in teaching the children about environment which was focused on by question number three and strong results with greater than 80% result in both the groups post survey.

Looking at the results of the questions in the group 2, it can be suggested that they tend to align with the supporting research materials. As the main purpose of the study was to look at how student video creation can help enhance the learning process, we will look at questions 1 and 5 to understand the effectiveness of the project work on the course.

I understand the contents of a course better if I do a project at the end of the course?

	Question 1 Pre	Question 1 Post	Percent Increase after Project
Control Group	37% and 32% = 69%	50% and 24% = 74%	5
Target Group	19% and 45% = 64%	21% and 52% = 73%	9

Table 1: Results of the Question 1 in Group 2

Doing a project at the end of the GreenCity course helped me develop my skills further?

	Question 1 Pre	Question 1 Post	Percent Increase after Project
Control Group	51% and 30% = 81%	50% and 34% = 84%	3%
Target Group	25% and 42% = 67%	28% and 52% = 80%	13%

Table 2: Results of the Question 5 in Group 2

In case of the verbal feedback by the groups there have been instances in the target group responses where it tends to indicate that the children enjoyed doing the project more. Also there seems to be indication that the research carried out to create such a video project has been extensive. There have been at least 5 instances where (Student Ids: 20200201308106, 20200201308099, 20200201308060, 20200201308071, 20200201308049), there is mention about research and organizing the topic for the project. This seems to indicate that the exercise of creating videos helped in the improvement of Literacy skills, Communication, and presentation skills: Higher-order thinking skills and Metacognitive skill for reflection. This is evident in some of the

student video where the student is suggesting methods to conserve the resources while asking question about why we are not taking similar actions. (Figure 13)

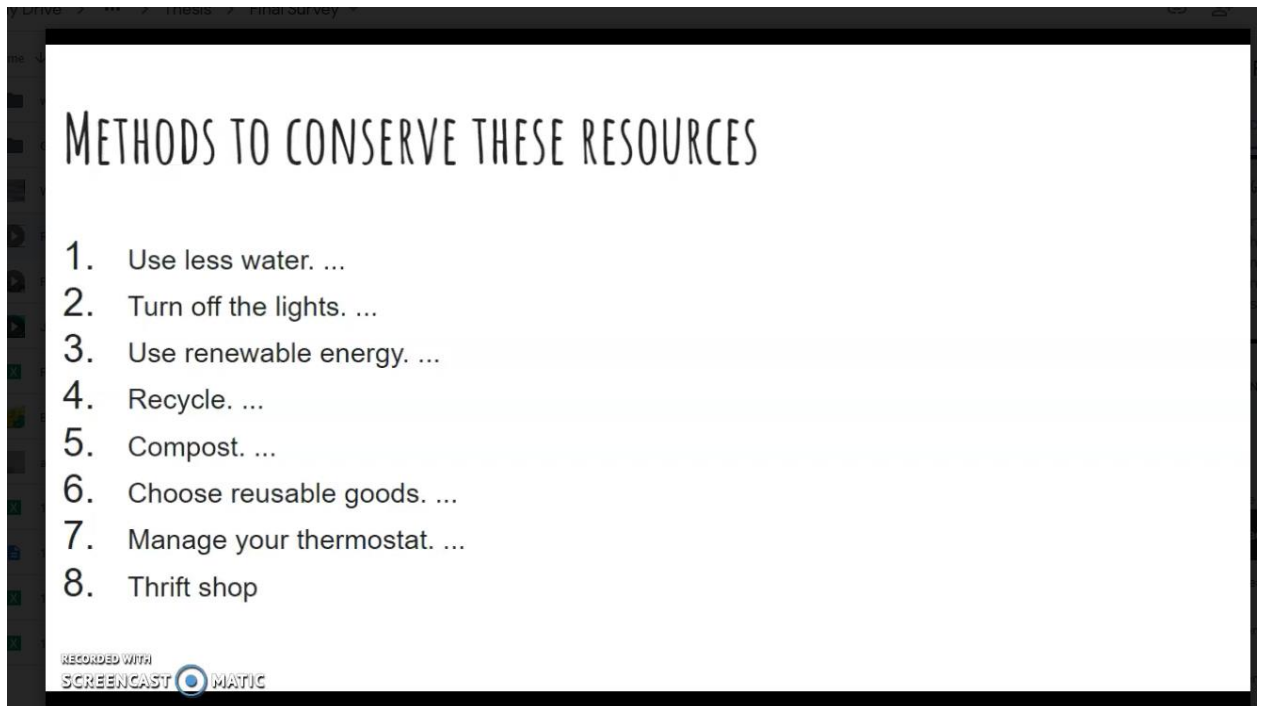


Figure 13: Screen grab from video presentations Student id: 20200201308034

5.3 Project Feedback

There was notable instances as part of the study where the children in both groups have shown skills discussed in the three modes as represented by Schuck and Kearney (2004). When in their paper it was discussed as Mode 3 (Reflection) being one of the most used in case of utilizing the digital video creation. Some of the participants in the control groups have shown skills of preparing, organizing, and executing a video on their own. We could see the students giving examples of what they were talking about as either material in their hand or as small animations as part of the video when they explained a concept. For example, the student video: 20200201308049 had multiple instances of pictures on the screen when explaining the concepts. This supports the idea discussed earlier about the skills from Schuck and Kearney (2004), especially regarding the movie making skills, the communication and the presentation skills, the video shows the student creating or recording the video by themselves which is evident in many instances for example when the student comes forward to stop the recording in her laptop.

Many of the videos are in the format of a seminar, where the children are discussing not only the things taught as part of the course but also coming with new ideas and pointers. For example, the course discussed about the usage of a plastic pen and how switching to a fountain pen which is reusable can reduce the use of plastic. On top of this, there were instances of children discussing solutions such as the importance of carrying cloth bags to the shops to reduce use of plastic bags. In numerous videos, there is an example of how their waste segregation practices at home have changed. This tends to indicate the Mode 1 which is discussed in Schuck and Kearney (2004) which emphasises the use of video not only as a tool for creating a learning log, but also as a documentary creation or an instructional log.

5.4 Interpretations

The observations and results from the study tends to point to the previous research materials. Even though there is no specific evidence of children who did the video-based project doing considerably better in their course evaluation, its suggests a tendency of children 'owning' a video-based project more and taking more initiative to complete the project. This argument is supported by the previous papers on the same topic. "The cases we have discussed here, together with the beliefs and perceptions of both students and teachers, clearly indicate that student generated digital video projects can be used to develop authentic learning. In contrast to more traditional tasks where materials and processes are imposed on students by teachers, DV projects were typically student driven and required a high degree of student initiative. Students collaboratively designed their own projects, produced them, and evaluated them (Kearney, Matthew & Schuck, Sandra, 2006, p. 12)".

Building on that interpretation as the students take this project which will need a high degree of their own initiative, we could argue that such learning using DV skills can help them organize their thoughts and learning better. As seen from the responses, video making has contributed to organizing the topic in the presentation of the seminar in a meaningful way. From this one can suggest that creating a video about a topic can help in the learning and organizing of the topics in a meaningful way.

5.5 Limitations

This study was restricted to understanding the learning outcome of a co-curricular program on sustainability and environment. While the results tend to show support for earlier studies, we cannot extrapolate the findings to academic subjects in the current situation. There were other factors during the time at which this course was conducted which also could affect the outlook of children towards learning online and thus its outcomes. The listed scenarios below can be seen as limitations or special situations which could affect or limit the results of the study:

1. The Covid-19 pandemic situation which started six months before the study was conducted has imposed more studies online. In the school that the study was conducted, based on the common understanding of the economic situation that the children in the school come from there was already experience among children to learn things online.
2. The study was conducted while the teaching and schooling was happening completely online. This means the student-student interactions and student-teacher interactions were all limited to online chat groups, video calls etc.
3. As the schooling was happening more at home the support and interaction from the parents that the students got could be more than in the usual times. This study does not do a comparative study could provide results differently in case the children were going to school and learning in the normal situations.
4. This could have affected the projects works positively as well as negatively. The personal interaction between children during normal situations could have led children to share ideas for easily and come up with better solutions or project results.

5.6 Recommendations

As a result of this study, the author would like to recommend similar studies be conducted on subjects related to academic topics and contrasting the outcomes with academic evaluation received in the examinations. For example, a study could be completed with a STEM related subject with the creation of videos for related experiments or learning reflections. Once the study is done a test on the similar topic could reveal the difference in understanding of the topic. The control group could do a project similar to what is conventionally followed in academic curriculum as creating a

report or a write up on the topic in question. This would need extensive co-operation with the teachers and school authorities.

Another recommendation from the author is to conduct a similar study when school systems lift restrictions after the Covid-19 pandemic. As mentioned earlier in the limitations, the author feels the lack of interaction between the students in the school could be a limiting factor or a variable in this study and could affect the study results. Considering that the children now communicate between each other through digital and social media could mean that, this recommendation could show similar results.

6 CONCLUSION

within response to rapidly changing learning technologies, the educational system is in the process of evolving to use the available learning instruments to their fullest. Technology as in many other cases can be a double-edged sword and digital video creation is one which is a perfect example. As children spend a lot of time on the internet consuming digital content, with proper guidance they can be encouraged to use the same medium for learning purposes. As discussed in many of the previous studies, the limitations that existed which restricted the use of digital video as a learning instrument has gradually eroded and is now available to most of the students. In this study, the students were asked to complete a project as part of a post-course assignment in a co-curricular program on waste management and sustainability. The control group and the target group created projects of various type and submitted their final work with many of them giving positive feedback about the course. Interestingly, the post-project responses in the control group tend to show more positive change in the questions regarding the implementation of the project. This response trend could support the previous studies conducted which tend to show that student-generated digital video projects strongly enhance student motivation and autonomy (Schuck, Sandra & Kearney, Matthew (2006). The study also gave indications of participating students noting how the digital video project helped them with organising and presenting the learnings in a more meaningful way.

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