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1. Overview

1.1. Background and objectives

The COVID-19 pandemic has had a significant impact on education systems around the world. In many cases, educational systems were not prepared for the shift to online learning, and this led to a number of challenges, including poor internet connectivity, lack of digital equipment, and inequalities between students with access to technology and those without.

In response to these challenges, institutions and organizations have been developing a number of innovative solutions. These include apps and other digital tools that can help to improve the quality of online learning. This project sought to identify, analyze, and promote these innovative solutions in at least five APEC economies.

The project also sought to encourage the use of technology at educational institutions in the APEC economies, and to promote gender equality by prioritizing solutions created by women.

By sharing these solutions, the project hoped to address the challenges posed by the pandemic and to improve the quality of education for all students in the APEC region.

1.2. Methodology Digital Innovation and Educational Opportunities

1.2.1. Platform and preselection of apps

The search for apps began with the definition of critical features that define appropriate apps. The study identified 22 variables. Some of these variables included are: target audience, percentage of women in development team, academic subjects included, school or individual use, press reports, languages use, free or paid usage and others.

Using these variables, the project found 12 apps and contacted their developers to provide information on the variables identified. Then, the project team selected the most relevant variables considering the needs of policy makers and principals and teachers:

- Academic subject: subject covered.
- Cost: free or paid access.
- Alignment to the curriculum: alignment to the official curriculum of a certain economy.
- Impact study using randomized controlled trials: evaluation by using a randomized controlled trial, a standard tool for evaluating the effectiveness of educational interventions.
- Teacher-created questions: possibility for teachers to create their own questions.

- Percentage of women on the development team: women representation in the development and/or implementation of educational technology.

1.2.2. The voting process

The voting process for the selection of the best educational apps was rigorous and transparent. The process had five stages:

1. Selection of the finalist apps: after an exhaustive and careful study, the project team selected 12 finalist apps. These apps were chosen based on the features, potential impact, and alignment with the project's goals.
2. Design of the project website: the project team designed a website that contained detailed information on the selected apps and their main features. The website also included existing videos of each app.
3. Inviting voters: the project team invited PPSTI, PPWE (Policy Partnership for Women and Economy) and HRD (Human Resource Development) foras of APEC and other actors related to education and educational research to participate in the voting process. Voters were allowed to cast up to 5 votes out of 12 available apps.
4. Voting process: the voting process was conducted online through the project's website. The voting period lasted for one month.
5. Review of the results and notification of the winning development teams: once the voting period ended, the project team reviewed the results and notified the winning development teams. Then, the process of videos creation has started.

A total of 532 votes were cast from 150 voters from 12 economies.

High participation of voters from different economies shows that the results were fair and representative of the views of the educational community. The voting success demonstrates the potential of using online voting to select educational apps in future projects.

1.2.3. The webinar

The project organized and delivered the APEC PPSTI 01 2021 Digital Innovation and Educational Opportunities webinar. 71 participants registered, but 51 participants attended. They came from 14 different economies coming together to explore and discuss the latest developments and challenges in the field of digital innovation in education, and the impact and changes after the pandemic. Of those participants, 33 were females and 18 males. The high female proportion highlights the commitment to gender diversity and equity in the project.

In addition, almost one third of participants of the webinar were government officials, that demonstrates importance and relevance of the project's topic in the policy-making arena. The panel of expert speakers provided valuable insights and shared best practices on how to harness the power of technology to improve educational outcomes and access for all learners.

The project conducted a post-webinar survey as well and the result of the survey was positive: participants found the content relevant, engaging, and informative.

One of the most important and unique features of this webinar was the presentations by the State Minister of Education, Culture, Sports, Science and Technology of Japan, Minister of Education of Peru, and Minister of Education of Chile. Each one welcomed the participants and summarized the core strategies of the STI policies of their economies. The ministers' participation symbolizes a collective effort and unity to promote education, and a commitment to collaborate and work together to advance STI based educational initiatives and goals. It was a unique opportunity for participants to gain a broader understanding of global perspectives and insights.

Overall, the APEC Digital Innovation and Educational Opportunities webinar underscored the importance of leveraging digital innovation for educational development. It also provided a valuable strategy for policymakers, educators, and other stakeholders to share knowledge and collaborate on initiatives that could have a positive impact on learners and communities around the world.

1.3. Results

The project contributed to the awareness of the opportunities of using digital innovations to improve education in the APEC region. By identifying and promoting innovative solutions, the project helped to address the challenges posed by the pandemic and to improve the quality of education for all students. This way the project encouraged the use of technology at educational institutions in the region. The project also promoted gender equality by prioritizing solutions created by women.

These results were obtained through six intermediate results:

- A preselected set of educational apps developed in the region that satisfy a list of requirements
- Development of website and its use for the project's activities
- A set of five apps selected by a carefully designed voting process
- Video production of the five most voted apps
- A webinar with the participation of three ministers
- A carefully designed survey
- Results of the survey with its analysis

The project generated a number of recommendations for the 21 APEC economies:

- **Recommendation 1:** Continue promoting **gender equality** by prioritizing solutions created by women.
- **Recommendation 2:** Improve the **quality of education** using innovative digital technologies for all students in the APEC region.
- **Recommendation 3:** Higher **integration** between economies and developers.
- **Recommendation 4:** Consider strategies addressing the special conditions of **rural** schools.
- **Recommendation 5:** Increase the **frequency** of dissemination events.
- **Recommendation 6:** Consider the participation and **true inclusion** of all the educational community on the events, including district superintendents, principals and teachers.

- **Recommendation 7:** Include **synchronic translation** to local languages that is now possible with technology.
- **Recommendation 8:** Start planning strategies to help **scale** to all the education communities of the 21 economies.

2. Methodology

2.1. Creation of the project web page

One of the central activities of the was the creation of a web page that communicated in an attractive signature the nature of the project, the apps collected and allowed the voting process. In various stages and with consecutive revisions, the project designed and built the website. The process was divided into the stages identified below.

First, the project defined the details and elements that should integrate the web page, from the graphic part to the diagramming and fundamental sections. The criteria were agreed between the team members.

Second, the project used the CANVA tool to develop a design that brought together all the aspects decided in the previous stage. The design was discussed and approved by the team members and

Third, the project team provided information for the website that included general information on the project, introduction of the voting dynamics, the information on each app among others.

Fourth, the voting platform was launched and the deadline for the voting set up.

Fifth, once the voting process was finished, the information of the most voted five apps was displayed in a format approved by the project's team.

Sixth, once 5 apps were identified the website was re-designed for the registration for the webinar with relevant information on webinars like General Information Circular and time zones among other important data.

In summary, the creation of the web page for the APEC PPSTI 01 2021 project was a complex process that involved several stages.

2.2. Methodology for apps selection

The app selection process fully achieved its goal, with 1,429 votes cast by 532 people from 12 economies. The voting process was conducted through a website that collected information about the apps, including their features, benefits, and target audience. This information was then published on the website for potential voters.

The methodology for the selection of apps had the following stages:

- a) The project team first conducted research to identify potential apps among APEC economies. 20 apps were identified and the team connected with the developers through available contact details.
- b) The project team then defined the criteria to be used to evaluate each app. After an exhaustive and careful study, the project selected the 12 finalist options. They are listed in the *ANNEX III*.

- c) The project team then designed an appropriate project website, and specifically adjusted for the voting process. It contained detailed information on the selected apps and their main features.
- d) The project then conducted the voting process. Once the voting period had elapsed, the project reviewed the results and notified the winning development teams.

2.3. Video design and development

One of the main objectives of the project was creation of short videos of most voted 5 apps in order to make the APEC region aware of their work and the possibilities they offer. The adequate design and production of the videos were important to capture the experience, needs, and strategies of the developers, as well as the characteristics of the potential viewers in the webinar and beyond. This ensured that the videos were informative, engaging, and relevant to the target audience.

The video design and production process for the winning apps of the APEC Project consisted of the following steps:

- Defining the key aspects to be highlighted in each video.
- Preparing the preliminary scripts for the videos, based on the key aspects identified by the project team.
- Contacting with the apps developers to conduct interviews for the videos and to better understand the essence of the apps.
- Videos production.

The video production process was a collaborative effort between the project team that allowed to create high-quality videos that effectively showcased the five winning apps.

2.4. Webinar

The project team selected the keynote speakers and prepared the event agenda. The team also prepared the registration system, guest list, and logistics.

- webinar preparation included identification of keynote speakers for both webinars with relevant knowledge and expertise (Santiago Cueto from GRADE foundation in Peru and Carl Pennypacker from University of California at Berkeley). In addition, speakers representing each of the winning apps were identified.
 - Webinars were designed to be conducted in different time zones to allow participants from different economies of APEC to be able to connect in convenient for them time.
 - The webinar agenda included time for Q&A sessions in order to ensure that participants, and especially apps development teams from different economies, can exchange their views and experiences and build understanding between them.
 - After the webinars evaluation survey was distributed within participants in order to analyze whether the project has met its objectives.

Some of the strengths and most attractive points of the execution of the APEC PPSTI01 2021 project were:

- The creation of a project website to provide information about the project and the selected apps.
- The use of website for the voting process to select the winning apps. This ensured that the selection process was fair and transparent, and that the winning apps were chosen by a wide range of stakeholders.
- The invitation of a wide range of stakeholders to participate in the voting process. This ensured that the views of a wide range of people were represented in the selection of the winning apps.
- The use of keynote speakers from different economies to provide insights into the use of technology in education. This helped to make the webinar more engaging and informative, and it also helped to promote the project to a wider audience.
- The preparation of specific videos for each app to be shown during the webinar. This helped to make the webinar more engaging and informative, and it also helped to give people a better understanding of the different apps that were available.
- The use of a survey to evaluate the webinar and the project. This helped to identify areas where the project could be improved, and it also helped to measure the impact of the project.

Overall, the APEC PPSTI01 2021 project used a variety of methods and tools to ensure that the project meets its objectives, and the high quality of the selected apps.

3. Results

It is considered that the project met the proposed objectives: the 12 apps from 7 economies were well-received by the voting community, and the 5 winning apps from 4 economies were featured in two webinars. The survey results were overwhelmingly positive, with participants praising the project's organization, content, and overall impact.

3.1. Apps preselected

3.1.1 Variables gathered

The APEC project preselected a number of apps for study. The following variables were gathered and analyzed:

- Economy: The economy in which the app was developed.
- App name: The name of the app.
- Brief description of the app: A brief description of the app's purpose and features.
- Web page: The app's web page, if available.
- Developer name and contact details: The name of the app's developer.
- Target audience: students, teachers and/or the general public.
- Percentage of women in development team.
- Academic subjects covered by the app.
- Scope of use: school or Individual use.
- Press report about the app, if available.
- Impact assessment and /or randomized controlled trials (RCTs) performed.
- Multiple choice or Open-ended questions.
- Alignment to the official school curriculum of a certain economy.
- Language of the app.
- Free or paid access.
- Online and/or Offline access.
- Additional Information: Any additional documents about the app, such as a user manual or a white paper and/or video sources and publications and other.

The apps varied widely in terms of their features and functionality. Some of the apps were aligned to the official school curriculum, while others were not. Some of the apps were free, while others were paid.

Twelve apps were preselected. They received 1,429 votes. The preselected apps were the followings:

The information on the features of the preselected apps is in a Table in the *ANNEX III*.

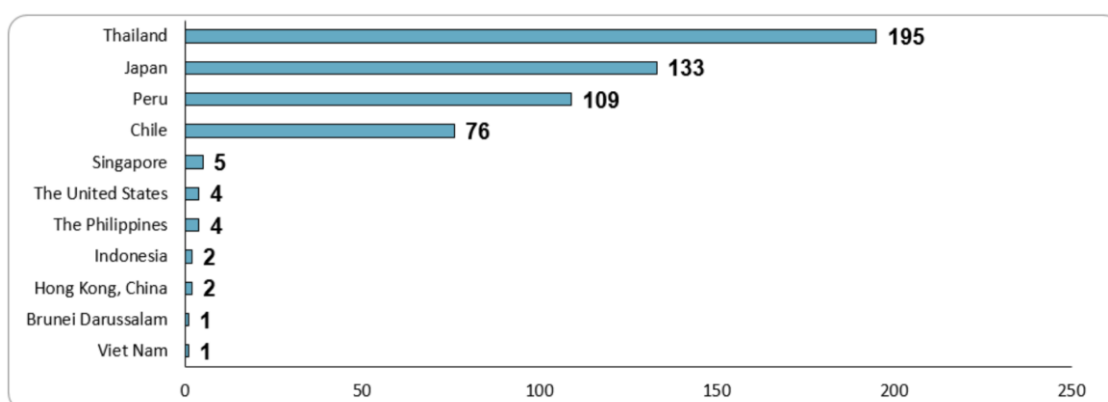
The 12 apps preselected by the team project are all designed to help students learn and develop essential skills. The apps cover a wide range of topics, including mathematics, science, language arts, and critical thinking.

3.1.2. Variables for the voting process

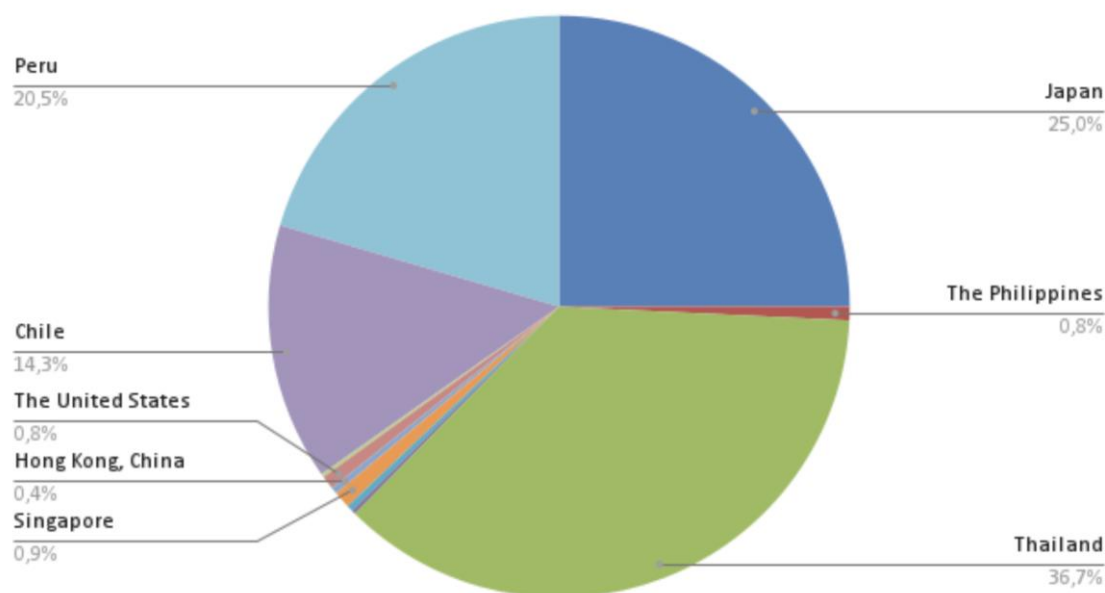
The main variables selected for the voting process were academic subject, cost, alignment to the curriculum, impact study using randomized controlled trials, teacher-created questions, and percentage of women on the development team. The gender issue was highlighted because it is important to ensure that women are represented in the development of educational technology. Women bring different perspectives and experiences to the table, which can lead to the development of more effective and inclusive educational tools.

3.1.3. Votes received

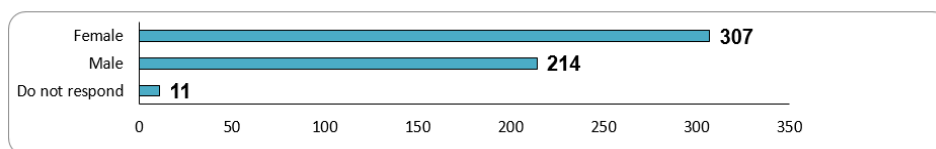
The votes received from the different economies were the following.



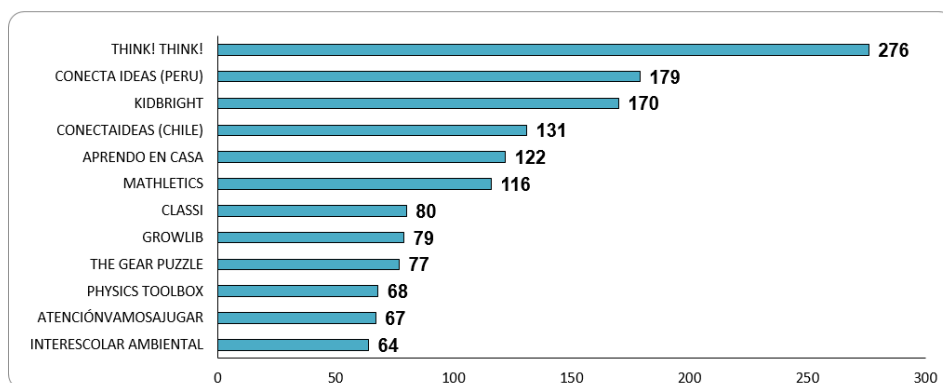
In percentage terms, Thailand had 36.7% of the votes, Japan 25%, and Peru 10,5%.



The votes by gender were 307 votes by females and 214 votes by males. 11 voters did not input their gender.



The voting process was very successful. 1,429 votes were received. All the apps received votes.



In summary, a total of 1,429 votes were received from 12 economies in the recent voting process. All the apps received votes, with Think Think! receiving the most votes (276) and Interescolar ambiental receiving the least (64). Voting was very even and competitive, with the 7 apps with the fewest votes receiving between 116 and 64 votes. This represents 39% of the total vote. The votes were split fairly evenly between genders, with 307 votes from females and 214 votes from males. 11 voters did not input their gender. The top 4 economies in terms of votes were Thailand (195), Japan (133), Peru (109), and Chile (76). Other economies that voted included Brunei Darussalam; People’s Republic of China; Hong Kong, China; Indonesia; The Republic of the Philippines; Singapore; The United States; and Viet Nam.

3.2. Five most voted apps

3.2.1. THINK! THINK!:

THINK! THINK! is an educational app designed to help children develop their critical thinking skills by providing them with over 20,000 intellectually stimulating quizzes and puzzles.

Here is the app video developed by the project:

- [Link video Think Think](#)

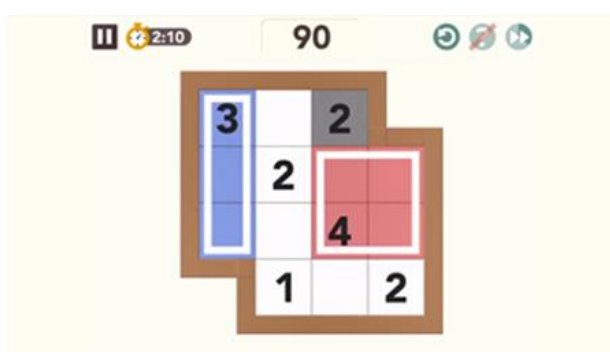
The app has a variety of activities that are designed to challenge children’s minds and help them develop their cognitive abilities. It contains quizzes, puzzles, and other activities to help children think more critically and logically. The quizzes involve multiple choice and true or false questions and the puzzles involve problem-solving and creative thinking. The app also has an in-app store where users can download additional content such as books and other educational materials. This helps to reinforce the learning

process and also encourages children to explore different topics. Overall, THINK! THINK! is an excellent educational app for children. It is an engaging and interactive way for children to develop their critical thinking.

Main features are:

- Economy: Japan
- Subject: STEAM
- Associated cost: Partly paid
- Curriculum Alignment: Partly aligned to the CV of Japan
- RCT: <https://www.rieti.go.jp>
- Teacher can create questions: No
- Women`s participation (developer team): 50%

App Video: https://youtu.be/oK21I1_pAwM



- Developer details:
- Developer: Wonderfy
- Mail: info@think.wonderlabedu.com

3.2.2. KidBright:

This is a learning platform helping students to increase learning engagement and to build essential 21st-century skills. KidBright platform consists of KidBright board for teaching coding, KidBright PLAYGROUD for teaching data science and KidBright AI for teaching artificial intelligence.

Here is the app video developed by the project:

- [Link video KidBright](#)

Main features:

- Economy: Thailand
- Subject: AI, Codification, Data science, Programming.
- Associated cost: Free
- Curriculum Alignment: Aligned to the US Common Core State Standards Mathematical Practices
- RCT: Not available
- Teacher can create questions: No
- Women`s participation (developer team): 33%

- App Video: <https://youtu.be/1mso5WPcDS0>



Developer details:

- Developer: NECTEC
- Mail: petchpring.chi@nectec.or.th

3.2.3. Aprendo en casa:

The Peruvian Ministry of Education has developed Aprendo en casa, a mobile application designed to support learning in hybrid contexts. This app was developed in response to the pandemic and is designed to help close the learning gap by providing students with access to learning materials related to mathematics and communication.

Here is the app video developed by the project:

- [Link video Aprendo en casa](#)

The app provides students with access to a range of activities, videos and materials that can be used to improve their knowledge and skills in mathematics and communication. Through the app, students can access activities, videos and tutorials related to mathematics and communication. The app also provides tools and resources to help students develop their skills in areas such as problem solving, critical thinking, logical reasoning and data analysis. In addition, the app also provides tools and resources to help teachers develop their skills in areas such as lesson planning, assessment and teaching strategies. This allows teachers to better support students in their learning and development.

Main details:

- Economy: Peru
- Subject: Mathematical reasoning, verbal reasoning, vocational guidance.
- Associated cost: Free
- Curriculum Alignment: Of Peru
- RCT: Not available.
- Teacher can create questions: No
- Women`s participation (developer team): 68%
- App Video: <https://youtu.be/PxN87tgERmQ>

Developer details:

- Developer: Ministerio de Educación del Perú



3.2.4. Conecta Ideas Peru:

Conecta Ideas Peru is an app designed for students in Peru to learn and practice mathematics in an interactive way. The app is adapted to the Peruvian math curriculum and provides exercises that are specifically tailored to the students' needs.

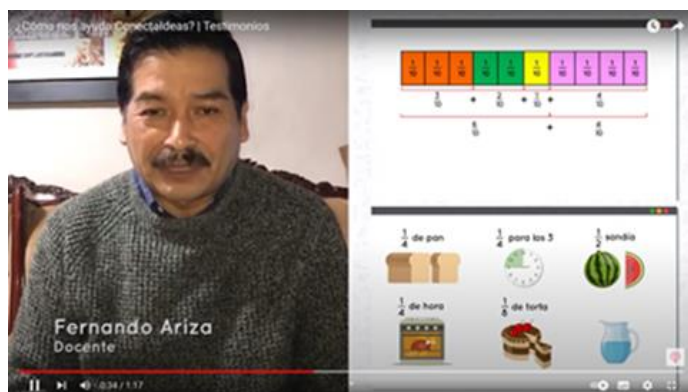
Here is the app video developed by the project:

- [Link video Conecta Ideas Peru](#)

The app also features a variety of exercises and activities, such as lessons on basic mathematical operations, problem solving, and geometry. Additionally, the app includes activities to help students develop their critical thinking and problem-solving skills. The app also features interactive games, which can be used to reinforce the concepts taught in the lessons. The games are designed to help students understand the concepts in a fun and engaging way. In addition to the lessons and activities, the app also includes a variety of tools that can be used to help students track their progress, such as a progress tracker and a scoreboard. These tools can help students stay motivated and focused on their goal of learning and mastering math. The app features lessons, activities, and games that are specifically tailored to the Peruvian math curriculum, as well as tools to help students track their progress.

Main features:

- Economy: Peru
- Subject: Maths
- Associated cost: Free
- Curriculum Alignment: Of Peru
- RCT: Not available.
- Teacher can create questions: Yes
- Women`s participation (developer team): 90%
- App Video: <https://www.youtube.com/watch?v=GK05MBjg5yc>



Developer details:

- Developer: GRADE
- Mail: conectaideasperu@grade.org.pe

3.2.5. ConectaIdeas Chile:

The ConectaIdeas app developed by Chilean researchers is a revolutionary tool designed to help K12 students learn and practice mathematics. By connecting ideas and concepts, the app helps students develop a better understanding of mathematics and its applications in the real world.

Here is the app video developed by the project:

- [Link video Conecta Ideas Chile](#)

The app is based on the idea of connecting mathematical concepts with real-life examples. It uses technology and interactive games, to make learning more interesting and engaging. This helps students to better understand and retain the concepts they are learning. The app also provides comprehensive learning materials, such as tutorials and practice exercises, which can be tailored to the student's level of understanding. This allows students to progress at their own pace and to focus on the topics and areas they find most difficult.

The app also includes a student progress tracker, which allows students to monitor their own progress and see how far they have come. This encourages students to stay motivated and to keep practicing until they have mastered the concepts. Overall, the ConectaIdeas app provides an innovative and effective way for K12 students to learn and practice mathematics.

App objective: An app to learn and practice mathematics in an interactive way

Main details:

- Economy: Chile
- Subject: Maths
- Associated cost: Free
- Curriculum Alignment: Of Chile
- RCT: <https://publications.iadb.org>
- Teacher can create questions: Yes
- Women`s participation (developer team): 10%
- App Video: <https://youtu.be/YS0ny8JOnBo>



Developer details:

- Developer: AUTOMIND

3.2.6. Summary of the five most voted apps.

In summary, all apps selected were oriented to gamification. Gamification in K12 education is becoming increasingly more powerful with technology-based education games and apps. Technology-based education games and apps offer students an interactive, engaging, and fun way to learn, which allows students to remain motivated and focused. The apps use gamification techniques to encourage students to learn and improve their skills. They have points, rewards, and challenges that keep students excited and interested in the learning process.

The apps most voted offer students access to a wide variety of educational content, which allows students to explore and learn in a way that is tailored to their individual learning style. For example, students can play educational apps that are designed to improve their language, math, or science skills, or they can play educational games that are designed to teach them about history or geography. The apps also provide students with access to real-time feedback, which helps them track their progress and allows them to adjust their learning strategies accordingly.

Overall, the apps offer students a unique and exciting way to learn, engage, and improve their skills.

3.3. Webinar

The webinar was scheduled for two days. The agenda for both webinars can be seen in the *ANNEX I*.

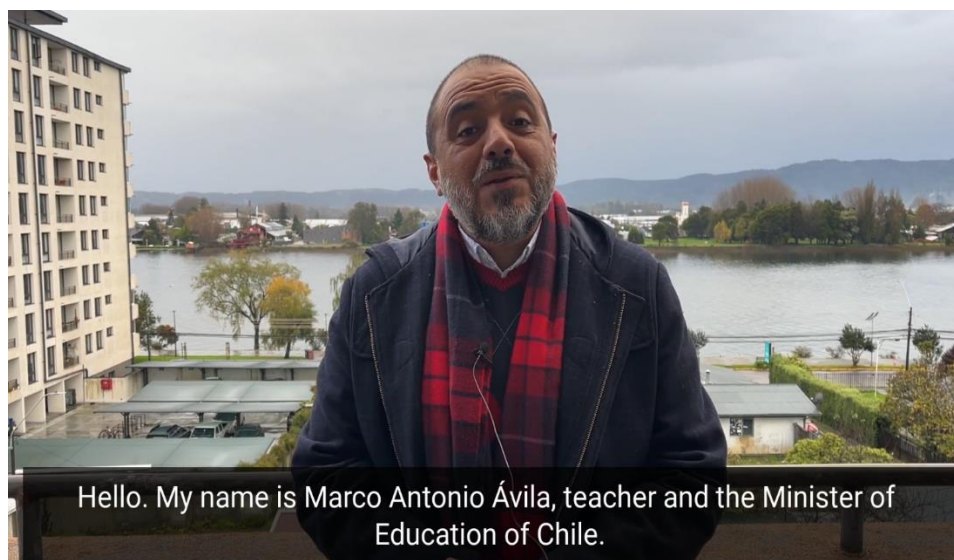
The webinar was held on 23 and 25 May 2023 through virtual platform. The event was organized by the National Agency for Research and Development of Chile (ANID). The State Minister of Education, Culture, Sports, Science and Technology of Japan, and the Ministers of Education of Peru and Chile sent welcoming remarks for the participants. They expressed their support for the use of technology in education and highlighted the importance of collaboration among economies in developing and implementing innovative educational solutions.



State Minister of Education, Culture, Sports, Science and Technology of Japan



Minister of Education of Peru



Minister of Education of Chile

To the best of our knowledge, this might be one of the rare cases when three Ministers of Education jointly participated in an educational seminar. Additionally, the Ministers of Education of Peru and Chile highlighted the high incidence in their economies and schools of the selected apps. These apps were used during and after the pandemic¹.

The webinar featured keynote presentations by Dr. Santiago Cueto and Dr. Carl Pennypacker, who discussed the use of technology in K-12 education. The event also included presentations by the developers of five apps that were selected by public vote.

The list of apps and the respective presenters are:

- THINK! THINK! by Yuka Nakamura
- KIDBRIGHT by Saowaluck Kaewkamnerd
- Conecta Ideas Peru by Claudia Sugimaru
- Aprendo en casa by Pedro Collanqui
- ConectaIdeas Chile by Paulina Jaure

The webinar concluded with a question-and-answer session with the speakers and developers.

Some of the key highlights of the webinar were:

The participation of the high authorities from Japan, Peru and Chile who highlighted the importance of the use of digital innovation for education.

The keynote presentations by Dr. Santiago Cueto and Dr. Carl Pennypacker provided valuable insights into the use of technology in K-12 education.

The presentations by the developers of the five apps showcased the potential of technology to improve learning outcomes. First, the video summarizing the apps. Then, the respective developers presented their solution and answered questions. The question-and-answer session with the speakers and developers provided an opportunity for participants to learn more about the topic and to share their own experiences.

¹ Videos of the webinars: [DAY 1](#) & [DAY 2](#)

Overall, the webinar was a valuable resource for anyone who is interested in the use of technology in education. It provided insights into the latest trends in educational technology, showcased the potential of technology to improve learning outcomes, and offered opportunities for participants to learn more about the topic and to share their own experiences.

3.4. Survey

3.4.1. Survey design

The project developed a survey with the following goals:

- The survey should take no more than 10 minutes.
- The survey questions have to be presented in a clear and concise manner. Readers should not require to seek help to be able to answer.
- The survey results should give us indications on how to make improvements in the future .
- The results should be able to be used to promote the use of digital solutions for educational purposes in APEC economies.

20 questions were designed and are listed in the *ANNEX IV*. The survey questions were comprehensive and covered a wide range of topics, including the objectives of the project, the relevance of the agenda items, the quality of the presentations, the usefulness of the apps and associated services, and the potential for the project to improve education in the APEC region.

The survey questions were well-designed and easy to understand. The use of a Likert scale made it easy for respondents to rate their level of agreement or disagreement with each statement.

Some of the survey questions were open-ended, which allowed respondents to provide detailed feedback on the project. This feedback will be used to improve future projects and to ensure that they are more effective in meeting the needs of the APEC region.

3.4.2. Results of the survey

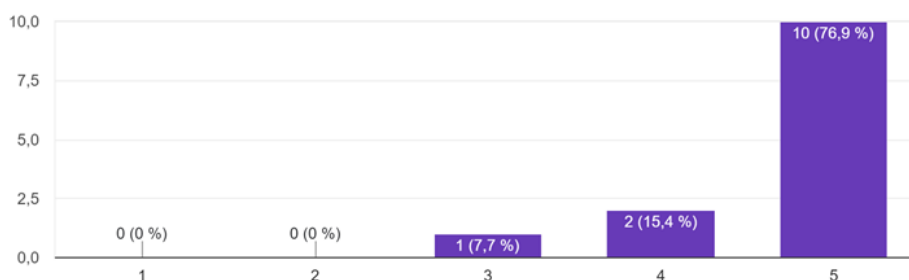
Out of 51 persons attended the webinar only 15 responded the survey that corresponds to about 30% of the participants. The analysis below is based on respondents replies.

The survey results showed that the webinar was well-received by attendees. The majority of respondents agreed that the objectives of the project and webinar were clearly defined, that the project achieved its intended objectives, and that the agenda items and

topics covered were relevant.

1. The objectives of the project and webinar were clearly defined?

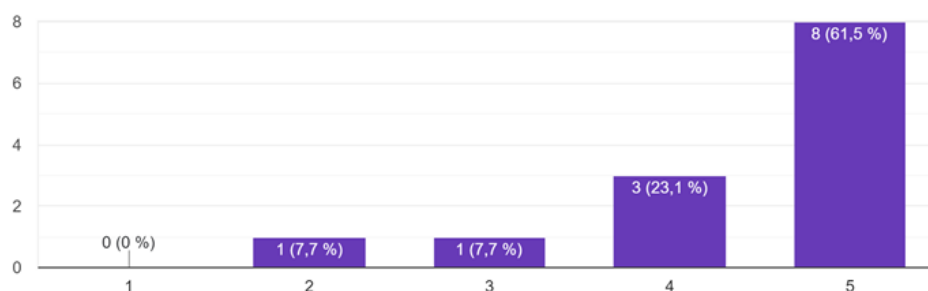
13 respuestas



Respondents also agreed that the content was well-organized and easy to follow, and that gender issues were sufficiently addressed during implementation.

4. The content was well organised and easy to follow?

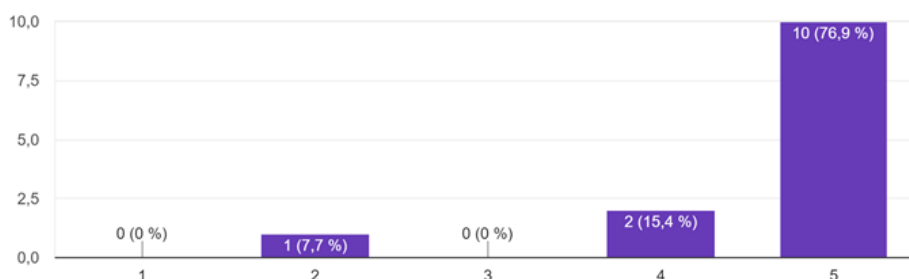
13 respuestas



Respondents also found the presentations in the webinar to be very useful.

6. The presentations in the webinar were useful?

13 respuestas

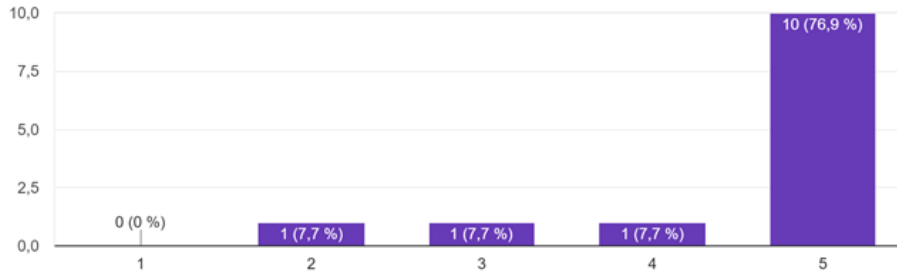


The majority of respondents agreed that the apps and associated services presented were relevant to their economy, and that the apps could be easily adapted to their

economy's curriculum. Respondents also found the interesting features of the presented apps and associated services to be helpful and informative.

7. Are the apps and associated services presented relevant to your economy?

13 respuestas

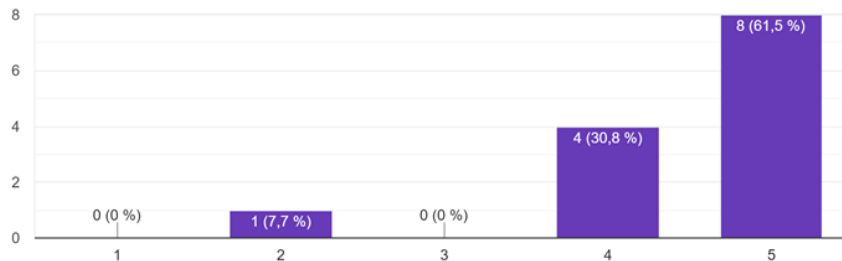


The majority of respondents also agreed that the time allotted for the webinar was sufficient. However, some respondents suggested that the webinar could have been longer to allow for more discussion and interaction between the presenters and the audience.

Overall, the survey results showed that the webinar accomplished its objectives. Attendees found the webinar to be informative, useful, and relevant. The majority of respondents agreed that the webinar achieved its intended objectives, and that the project was well-organized and executed.

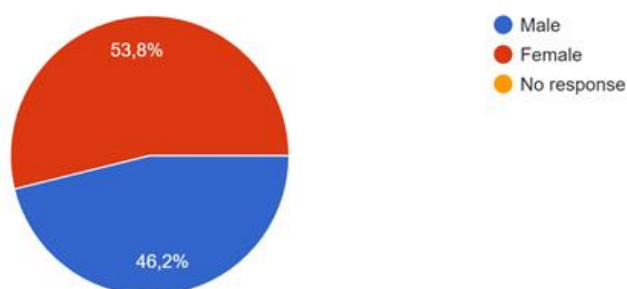
11. How relevant is this project to you and your economy?

13 respuestas



It is important to note that more than half of the respondents of the survey were female.

Gender:
13 respuestas



Some of the ways that the project could have been improved are the following:

1. The webinar could have been longer to allow for more discussion and interaction between the presenters and the audience.
2. The webinar could have been promoted more widely to attract a larger audience, such as district superintendents, principals and teachers
3. The webinar could have been made available to a wider audience through video recording or live streaming in other time slots more appropriate for district superintendents, principals and teachers.

The survey results can be used to improve future webinars on digital innovation and educational opportunities.

The audience response to the survey question was overwhelmingly positive. The majority of respondents felt that APEC should continue to promote its initiatives to governments and other stakeholders, and that more collaboration is needed among researchers, academicians, and other relevant parties. There was also a strong desire for APEC to take collective action on education and inequality, and to provide more support for teachers and educational institutions.

Here are some specific suggestions from the audience:

- Hold a seminar on education and inequality.
- Create a written format with all the programs and lessons learned.
- Promote APEC initiatives to governments.
- Increase collaboration among researchers, academicians, and other stakeholders.
- Take collective action on education and inequality.
- Provide more support for teachers and educational institutions.
- Create a marketing arm to reach more teachers and educational institutions.
- Introduce participants to educational institutions in other economies.
- Push the practices of digital literacy skills forward.
- Share the list of participants' names, titles, and email addresses.
- Align school curriculum in the region.

These suggestions are all very valuable and should be considered by APEC as it moves forward with its work on education. By taking these steps, APEC can help to ensure that all children in the region have access to a quality education, regardless of their background.

In addition to the specific suggestions from the audience, there were also some general themes that emerged from the survey. These themes included the need for:

- More collaboration
- More support for teachers and educational institutions
- More focus on equity and inclusion
- More attention to digital literacy

These themes are all important, and APEC should take them into account as it develops its future plans. By working together, APEC can make a real difference in the lives of children and youth in the region.

The audience response to the survey question about the project and webinar was also very positive. The majority of respondents felt that the project had been a valuable learning experience, and that they would use the knowledge gained to promote the use of digital solutions for educational purposes in their economies.

Here are some specific examples of how respondents plan to use the knowledge gained from the project:

- Learn strategies: Many respondents expressed a desire to learn more about the strategies that other economies have used to successfully promote the use of digital solutions for educational purposes. They hope to use this knowledge to develop their own strategies in their own economies.
- Get in touch with developers: Some respondents expressed a desire to get in touch with developers from other economies who have developed successful digital solutions for educational purposes. They hope to learn more about these solutions and to explore the possibility of collaborating with developers in other economies.
- Develop promotional events: Many respondents plan to develop promotional events to raise awareness of the benefits of using digital solutions for educational purposes. They hope to reach a wide audience, including teachers, parents, and policymakers.
- Promote the cost benefits: Some respondents plan to focus on promoting the cost benefits of using digital solutions for educational purposes. They hope to show that using digital solutions can save money in the long run, even though there may be some upfront costs.
- Develop trainings: Many respondents plan to develop trainings for teachers and other educators on how to use digital solutions effectively in the classroom. They hope to help teachers overcome any challenges they may face in using digital solutions, and to help them get the most out of these solutions.
- Develop policies: Some respondents plan to develop policies that support the use of digital solutions for educational purposes. They hope to create an environment that is conducive to the use of digital solutions, and to remove any barriers that may exist.

- Develop new procedures and tools: Some respondents plan to develop new procedures and tools to support the use of digital solutions for educational purposes. They hope to make it easier for teachers and students to use these solutions, and to improve the quality of education.

It is clear that there is a great deal of interest in promoting the use of digital solutions for educational purposes in APEC economies. The knowledge and experience gained from this project will be invaluable in helping to achieve this goal. The majority of respondents felt that the apps and associated services presented were different from those that already exist in their economies in a number of ways.

Here are some of the specific ways in which respondents felt the apps and associated services presented were different:

- Better alignment with the local curriculum: Many respondents felt that the apps and associated services presented were better aligned with the local curriculum than those that already exist in their economies. This was seen as a major advantage, as it would make it easier for teachers to use the apps in their classrooms.
- Focus on non-cognitive skills: Many respondents also felt that the apps and associated services presented placed a greater focus on non-cognitive skills, such as problem solving and collaboration, than those that already exist in their economies. This was seen as a positive development, as it would help to prepare students for the challenges of the 21st century.
- Availability of offline versions: Many respondents also felt that the availability of offline versions of the apps was a major advantage. This would make it possible for students in rural areas and other areas with limited internet access to use the apps.
- Combination of hardware and software: Some respondents also felt that the combination of hardware and software in some of the apps was a major advantage. This would allow students to learn in a more interactive and engaging way.
- Use of engineering tools: Some respondents also felt that the use of engineering tools in some of the apps was a major advantage. This would allow students to learn about engineering principles in a more hands-on way.

Overall, the audience response to the survey question about the project and webinar was very positive. The majority of respondents felt that the apps and associated services presented were different from those that already exist in their economies in a number of ways, and that these differences were positive.

4. Participants

4.1 Invited speakers

Santiago Cueto

Santiago Cueto has a degree in Educational Psychology from the Pontifical Catholic University of Peru and a PhD in Educational Psychology from the University of Indiana, United States. He has been a visiting scholar at the University of California at Davis and at the University of Oxford. He is currently the Principal Investigator of GRADE, from where he is the representative for Peru of the international study Children of the Millennium. Additionally, he is a senior professor in the Department of Psychology at the Pontificia Universidad Católica del Perú.

He was a member of the National Council of Education (CNE), of the Technical Council of the National Institute for the Evaluation of Education (INEE) of Mexico. He is President of the Peruvian Educational Research Society (SIEP) and Executive Secretary of the Research Fund for Education of the Program for the Promotion of Educational Reform in Latin America and the Caribbean (Inter-American Dialogue). He has been a consultant to international organizations such as the Inter-American Development Bank, the World Bank and the United Nations Educational, Scientific and Cultural Organization (UNESCO).

His main areas of interest are education and human development, particularly in contexts of poverty. He has published his articles in various academic journals and books and has been a reviewer of scientific articles in *The Lancet*, *International Journal of Educational Development*, *Revista de Psicología de la Universidad Católica*, *World Development* and *Children and Society*, among others.

In 2003, at the annual conference of the Global Development Network (GDN), one of his papers was awarded the medal for best research in the Education, Knowledge and Technology category (this study was later published as GRADE Working Paper 43). In 2010, he obtained the National Psychology Award from the National College of Psychologists of Peru. In 2016, he was named a distinguished alumnus of the Pontifical Catholic University of Peru. In 2018, he was awarded by the Ministry of Education with the Palmas Magisteriales in the grade of Amauta.

Carl Pennypacker

Carlton R. Pennypacker is an astrophysicist at the University of California, Berkeley and the Lawrence Berkeley Laboratory and is the principal investigator for the Hands On Universe project.

The Hands-On Universe (HOU) project began in the 1990s when Carl Pennypacker, a supernova research astronomer at University of California Berkeley, invited a group of astronomers and educators to a meeting at the Lazy-K Ranch near Tucson Arizona USA. In sharing of ideas about how to make astronomy education better, the idea of making real telescopes and telescope images available to teachers and students took root. Along with that, image processing software tools became necessary to provide, as well as

cooperation among astronomers and observatories to make telescope instruments available for use by schools.

Dr. Pennypacker has been motivated by the power and potential of student and scientist partnerships when teachers and students started discovering supernovae in the Hands On Universe project. Some of his discoveries have been featured in the news media.

He was awarded the Prix Jules Janssen of the French Astronomical Society in 2010.

Dr. Pennypacker has spent much of his career as a research astrophysicist, receiving his Ph.D. from Harvard in 1978. His principal research was the studying of supernovae and the building of techniques for their automated discovery. With Rich Muller, he co-founded the Berkeley Supernova Search, which later became the Supernova Cosmology Project. He shared the 2007 Gruber Prize in Cosmology and the 2015 Breakthrough Prize in Fundamental Physics for the Supernova Cosmology Project's discovery that the expansion of the universe is accelerating.

4.2 Webinar attendees

The project organized and delivered the APEC PPSTI 01 2021 Digital Innovation and Educational Opportunities webinar on 23 and 25 May. The list of participants is in the *ANNEX III*.

The webinar was a success, with 51 participants from 14 different economies coming together to explore and discuss the latest developments and challenges in the field of digital innovation in education, and the impact and changes after the pandemic.

71 people registered for the webinars, but 51 attended. The following graph shows this information. There were participants from 14 economies as shown in the following table.

Economy	Number of participants
Australia	1
Chile	4
Hong Kong, China	1
Indonesia	1
Japan	19
Republic of Korea	3
Mexico	1
New Zealand	1
Peru	7
The Philippines	2
Rusia	1
Chinese Taipei	1
Thailand	7
United States	2
Total	51

Most of them were from the economies whose apps were selected by the voting process.

Of those participants, 33 were females and 18 males, highlighting the commitment to gender diversity and equity in the field. Please see the list of attendees on Annex II.

5. Policy recommendations

5.1 Overview

The APEC project PPSTI 01 2021 – Digital Innovation and Educational Opportunities was a collaborative effort between the APEC Secretariat, the 21 APEC economies, and the active participation of the State Minister of Education, Culture, Sports, Science and Technology of Japan, and the Ministers of Education of Peru and Chile. The project aimed to promote the use of digital technologies in education in the APEC region.

The project included a number of activities, including:

- An innovative methodology to search, review and select apps developed on the economies.
- The selection of 5 apps.
- A webinar on the use of digital technologies in education, which was attended by representatives from the 14 APEC economies.

5.2 Summary of the recommendations

The project fully achieved its objectives, and it generated a number of recommendations for the 21 APEC economies. These recommendations include:

- **Recommendation 1:** Continue promoting **gender equality** by prioritizing solutions created by women.
- **Recommendation 2:** Improve the **quality of education** using innovative digital technologies for all students in the APEC region.
- **Recommendation 3:** Higher **integration** between economies and developers.
- **Recommendation 4:** Consider strategies addressing the special conditions of **rural** schools.
- **Recommendation 5:** Increase the **frequency** of dissemination events.
- **Recommendation 6:** Consider the participation and **true inclusion** of all the educational community on the events, including district superintendents, principals and teachers.
- **Recommendation 7:** Include **synchronic translation** to local languages that is now possible with technology.
- **Recommendation 8:** Start planning strategies to help **scale** to all the education communities of the 21 economies.

5.3 Recommendations

The participation of the State Minister of Education, Culture, Sports, Science and Technology of Japan, and the Ministers of Education of Peru and Chile in the PPSTI 01 2021 – Digital Innovation and Educational Opportunities APEC project was a significant event. It is extremely rare for three Ministers of Education to participate in the same scientific event, and their presence symbolizes a collective effort and unity to promote education. Their participation also demonstrates a commitment to collaborate and work together to advance ICT-based educational initiatives and goals.

The Ministers' presentations provided participants with a unique opportunity to gain a broader understanding of global perspectives and insights on the use of digital technologies in education. The Ministers also highlighted the high incidence of the use of apps in their economies and schools, both during and after the pandemic. This information is valuable to policymakers and educators who are working to improve the quality of education for all students.

The participation of the Ministers of Education in this project is a strong signal of government commitment to the use of digital technologies in education. It is also a significant step towards collaboration and cooperation among APEC economies in this area.

The following is a more detailed explanation of the eight policy recommendations for the 21 APEC economies, based on the findings of the APEC project PPSTI 01 2021 – Digital Innovation and Educational Opportunities:

1. **Recommendation 1:** Promote gender equality by prioritizing solutions created by women. The use of digital technologies in education can help to promote gender equality by providing girls and women with access to educational opportunities that they may not otherwise have. Governments should prioritize the development and use of digital educational resources that are created by women, and they should support initiatives that encourage girls and women to use digital technologies in education.
2. **Recommendation 2:** Improve the quality of education using innovative digital technologies for all students in the APEC region. Digital technologies can be used to improve the quality of education for all students in the APEC region. Governments should invest in the development and use of digital educational resources that are aligned with the economy's curriculum, and they should provide teachers with training on how to use these resources effectively.
3. **Recommendation 3:** Foster higher integration between economies and developers. Governments should work with developers in the private sector to develop and use digital educational resources that are appropriate for the needs of students in the APEC region. This will help to ensure that students have access to the best possible educational resources, and it will also help to support the development of the digital economy in the APEC region.
4. **Recommendation 4:** Consider the special conditions of rural schools. Digital technologies can be used to improve the quality of education for students in rural schools. Governments should provide financial support to rural schools so that they can purchase the necessary hardware and software, and they should also provide training to teachers on how to use these resources effectively.

5. **Recommendation 5:** Increase the frequency of dissemination events. Governments should increase the frequency of dissemination events so that policymakers, educators, and other stakeholders can learn about the latest developments in the use of digital technologies in education. This will help to ensure that everyone is aware of the benefits of using digital technologies in education, and it will also help to promote the use of these technologies in the classroom.
6. **Recommendation 6:** Consider the participation and true inclusion of district superintendents, principals and teachers. Governments should recommend the participation and true inclusion of district superintendents, principals and teachers in the development and use of digital educational resources. This will help to ensure that these resources are aligned with the needs of students and teachers, and it will also help to build support for the use of digital technologies in education.
7. **Recommendation 7:** Include synchronic translation to local languages that is now possible with technology. Governments should include synchronic translation to local languages that is now possible with technology. This will help to ensure that all the educational community, superintendents, principals, and teachers, regardless of their language background, have access to the best possible educational resources and strategies.
8. **Recommendation 8:** Start planning strategies to help scale to all the education communities of the 21 economies. Governments should start planning strategies to help scale to all the education communities of the 21 economies. This will help to ensure that all students have access to the benefits of using digital technologies in education.

ANNEXES

I. Agenda for the webinars

APEC WEBINAR ON DIGITAL INNOVATION AND EDUCATIONAL OPPORTUNITIES PPSTI01 2021

(Santiago de Chile, 23 - 24 May 2023)

Tuesday, 23 May 2023

- 09.30 –
10.00 Registration and Test Run
- 10.00 - 10:20 OPENING SESSION
- *Welcoming Remarks by ANID - Sharapiya Kakimova (3 min)*
 - *Video message ANID National Director, Mrs. Alejandra Pizarro (3 min)*
 - *Video message from the Ministry of Education Japan (3 min)*
 - *Video message from Peru's Minister of Education (3 minutes)*
 - *Video message from the Minister of Education of Chile (2 minutes)*
 - *Introductory remarks on webinar and/or project by Ph. D. Roberto Araya (3 minutes)*
- 10.20 –
10.40 THE USE OF TECHNOLOGY IN K12 EDUCATION By Dr. Santiago Cueto (20 min)
- 10.40 - 10.50 DISCUSSION (10 min)
- 10.50 - 10.53 Photo Session (3 min)
- 10.53 - 10.55 Introduction of the selection process and voting by Mario (2-3 minutes)
PRESENTATION OF THE APPS SELECTED BY PUBLIC VOTE
- 10:55 - 11.10 *Start of applications video (15 minutes approx.) Moderated by Dr. Roberto Araya*
- 11:10 - 11.35
- Yuka Nakamura about App THINK! THINK! (5 min)
 - Saowaluck Kaewkamnerd about App KIDBRIGHT (5 min)
 - Claudia Sugimaru about App Conecta Ideas Peru(5 min)
 - Pedro Collanqui about App Aprendo en casa (5 min)
 - Paulina Jaure about App ConectaIdeas Chile (5 min)
- 11.35 - 11.45
- 11:45 - 11.55 DISCUSIÓN (10 min)
- 11:55 - 12.00 Survey (10 min)
- Closing remarks by ANID Sharapiya Kakimova (5 minutes)

APEC WEBINAR ON DIGITAL INNOVATION AND EDUCATIONAL OPPORTUNITIES

(Santiago de Chile, 23 - 24 May 2023)

Wednesday, 24 May 2023

21.30 – 22.00	Registration and Test Run
22.00 - 22:20	OPENING SESSION
	<ul style="list-style-type: none">• <i>Welcoming Remarks by ANID - Sharapiya Kakimova (3 min)</i>• <i>Video message ANID National Director, Mrs. Alejandra Pizarro (3 min)</i>• <i>Video message from the Ministry of Education Japan (3 min)</i>• <i>Video message from Peru's Minister of Education (3 minutes)</i>• <i>Video message from the Minister of Education of Chile (2 minutes)</i>• <i>Introductory remarks on webinar and/or project by Ph. D. Roberto Araya (3 minutes)</i>
22.20 – 22.40	THE USE OF TECHNOLOGY IN K12 EDUCATION By Dr. Carl Pennypacker (20 min)
22.40 - 22.50	DISCUSSION (10 min)
22.50 - 22.53	Photo Session (3 min)
22.53 - 22.55	Introduction of the selection process and voting by Mario (2-3 minutes) PRESENTATION OF THE APPS SELECTED BY PUBLIC VOTE
22:55 - 23.10	<i>Start of applications video (15 minutes approx.) Moderated by Dr. Roberto Araya</i>
23:10 - 23.35	<ul style="list-style-type: none">• Yuka Nakamura about App THINK! THINK! (5 min)• Saowaluck Kaewkamnerd about App KIDBRIGHT (5 min)• Claudia Sugimaru about App Conecta Ideas Peru(5 min)• Pedro Collanqui about App Aprendo en casa (5 min)• Paulina Jaure about App ConectaIdeas Chile (5 min)
23.35 - 23.45	DISCUSSION (10 min)
23:45 - 23.55	Survey (10 min)
23:55 - 00.00	Closing remarks by ANID Sharapiya Kakimova (5 minutes)

II. List of webinars attendees

	First Name	Last Name	Gender	Economy
1	Sarah	Phillips	Female	Australia
2	Paulina	Jaure	Female	Chile
3	Elizabeth	Villanueva	Female	Chile
4	Alejandra	Pizarro	Female	Chile
5	Alejandro	Gimon	Male	Chile
6	Thomas	Ng	Male	Hong Kong, China
7	Lenny	Rosalin	Female	Indonesia
8	Nanako	Nakaie	Female	Japan
9	Koji	Nosaka	Male	Japan
10	Miho	Urakawa	Female	Japan
11	Eiko	Saito	Female	Japan
12	Daiki	Watanabe	Male	Japan
13	Yuka	Nakamura	Female	Japan
14	Tatsuya	Kurebayashi	Male	Japan
15	Song Dong	Kim	Male	Japan
16	Michiyo	Iwase	Female	Japan
17	Norihiro	Nishikata	Male	Japan
18	Ai	Noguchi	Female	Japan
19	Miya	Yoshimura	Female	Japan
20	Aya	Nagahata	Female	Japan
21	Huykong	Ung	Female	Japan
22	Rina	Yamagami	Female	Japan
23	Keiji	Nakajima	Male	Japan
24	Hajime	Shimayoshi	Male	Japan
25	Kei	Kawashima	Male	Japan
26	Lilet	Pepito	Female	Japan
27	Mya	Song	Female	Republic of Korea
28	Chaewon	Kim	Male	Republic of Korea
29	Gain	Lee	Female	Republic of Korea
30	Erik Andoni	Romero Arenas	Male	Mexico
31	Wendy	Hart	Female	New Zealand
32	Neydo	Hidalgo	Male	Peru
33	Santiago	Cueto	Male	Peru
34	Claudia	Sugimaru	Female	Peru
35	Pedro	Collanqui	Male	Peru
36	Gera	Rios	Female	Peru

37	Cesar	Sanchez	Male	Peru
38	Elva	Casas	Female	Peru
39	Maria Susan	Dela Rama	Female	The Philippines
40	Camila	Meneses	Female	The Philippines
41	Arina	Gavrikova	Female	Russia
42	Yanling Sophia	Lee	Female	Chinese Taipei
43	Hongfah	Veeranopparat	Female	Thailand
44	Petchpring	Chinawongse	Female	Thailand
45	Rinnapatch	Khongsuksipas	Female	Thailand
46	Chotima	Noopruck	Female	Thailand
47	Uracha	Nuchluab	Female	Thailand
48	Nontalee	Aeungkaew	Female	Thailand
49	Saowaluck	Kaewkamnerd	Female	Thailand
50	Carl	Pennypacker	Male	The United States
51	Daniel	Peluso	Male	The United States

III. Information on 12 apps pre-selected for voting

Economy	App name	Brief	Developer	Target audience
Australia	Mathletics	An app for learning and training mathematics	3p Learnig	Elementary, middle and high school
Chile	Conectaldeas	An app to learn and practice mathematics in an interactive way	AutoMind	Elementary and middle school
Chile	Atención, vamos a jugar	An app designed to develop and train logical mathematical thinking	Imactiva	Elementary School
Chile	Interescolar Ambiental	An app that aims to create the economy's largest environmental education network	Kyklos and Ministerio de Educación de Chile	Elementary, middle and high school
China	Growlib	A virtual reality app for education and introduction to professional training solutions	Geruling Technology	Elementary, middle, high school and college
Japan	Think! Think!	An app designed to develop children's critical thinking skills by using over 20,000 intellectually stimulating quizzes and puzzles	Wonderfy	Elementary school
Japan	Classi	An all-in-one app that can be used in various scenes of school life, such as communication, inquiry learning, learning videos, and daily learning records .	Classi Corp	Middle School

Peru	Conect aldeas	An app to learn and practice mathematics in an interactive way	GRADE	Elementary and middle school
Peru	Aprende en casa	An app To promote the development of learning related to the areas of mathematics and communication in hybrid contexts in order to close the learning gap in the post-pandemic scenario.	MINEDU del Perú	Elementary and middle school
Thailand	KidBright	A learning platform helping students to increase learning engagement and to build essential 21st-century skills. KidBright platform consists of KidBright board for teaching coding, KidBright PLAYGROUD for teaching data science and KidBright AI for teaching artificial intelligence.	NECTEC	Middle and high school
United States	Physics Toolbox	An app to record , display, and export data from your smartphone's internal sensors	Vieyra Software	Middle, high school and college
United States	The Gear Puzzle	An app to develop mathematical thinking skills (not basic skills!) in a way that “breaks the Symbol Barrier”	BrainQuake	Elementary, middle and high school

IV. Survey Questions

1. The objectives of the project and webinar were clearly defined?
Strongly disagree 1 2 3 4 5 Very much in agreement
2. The project achieved its intended objectives?
Strongly disagree 1 2 3 4 5 Very much in agreement
3. The agenda items and topics covered were relevant?
Strongly disagree 1 2 3 4 5 Very much in agreement
4. The content was well organized and easy to follow?
Strongly disagree 1 2 3 4 5 Very much in agreement
5. Gender issues were sufficiently addressed during implementation?
Strongly disagree 1 2 3 4 5 Very much in agreement
6. The presentations in the webinar were useful?
Strongly disagree 1 2 3 4 5 Very much in agreement
7. Are the apps and associated services presented relevant to your economy?
Strongly disagree 1 2 3 4 5 Very much in agreement
8. Can the apps presented be easily adapted to your economy curriculum?
Strongly disagree 1 2 3 4 5 Very much in agreement
9. What interesting features do the presented apps and associated services have?
10. The time allotted for the webinar was sufficient?
Strongly disagree 1 2 3 4 5 Very much in agreement
11. How relevant is this project to you and your economy?
Strongly disagree 1 2 3 4 5 Very much in agreement
12. Please explain your answer given in 11.
13. In what characteristics are the apps and associated services presented different from those that already exist in your economy?
14. Can you identify potential partners in your economy to explore incorporating the apps presented?
15. Did you knowledge about digital opportunities for education changed after attending this webinar?
16. Did you know that many APEC economies implemented use of app for education?
Yes No Not sufficiently enough
17. How will you use the knowledge gained from this project to promote use of digital solutions for educational purposes in your economy? Please provide examples (e.g develop new policy initiatives, organise trainings and or apps promotional

events, develop work plans/strategies, draft regulations, develop new procedures/tools etc).

18. What needs to be done next by APEC? Do you think it is relevant link the project's outcomes to subsequent collective actions by fora or individual actions by economies?*
19. How could this project have been improved? Please provide comments on how to improve the project, if relevant.
20. Please comment on anything else you would like to add.