

21st Century Skills and Digital Literacy: An India Case Study

Field Visit Report & Qualitative Tools

SAIS-ASER Centre Practicum: 2014-2015

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I. Introduction

From January 12, 2015 to January 25, 2015, the SAIS ASER Practicum Team conducted field visits in Delhi, Himachal Pradesh, and Rajasthan (see section VI for final agenda). Our objective was to collect qualitative data and to obtain in-depth context-specific observations regarding 21st century skills and digital literacy in India. The qualitative data was collected through focus group discussions (FGDs) and key informant interviews conducted by the practicum team and facilitated by ASER Centre staff. This report includes our final agenda, a summary of the data we collected including details on survey respondents, and the qualitative survey tools we developed, as well as a short section on lessons learned in the field that may be consulted to improve future fieldwork collaborations.

II. Lessons Learned

As we conducted our field visit, we learned some important lessons that we believe could allow for higher-quality, more efficient data collection in the future.

- **Solicit more local input into questionnaire design.** Our conversation with Ms. Melissa Goodnight, Ms. Ritambhara Mehta and Mr. Vikram Guria were extremely helpful in tailoring the questionnaires we had designed to the local context, and their input served to reduce misunderstandings and allowed us to collect better data during our interviews and FGDs.
- **Adjust the questionnaires after each interview.** With each interview, we and ASER staff gained useful knowledge on how to elicit information on certain concepts and how to structure the interviews/focus group sessions. It is good practice to incorporate these lessons into the questionnaires iteratively so that the quality of data improves over the course of the fieldwork.
- **Arrange in advance focus groups and interviews.** Our fieldwork relied heavily on convenience sampling. We showed up at schools with little notice and interviewed whoever was available. A disadvantage of this approach was that in some cases potential participants were missing, absent, or busy. It also meant that we had little control over the setting in which we conducted our interviews and focus groups. A more effective method of sampling would have been to invite people to participate in the study much earlier.
- **Better manage translators.** As this is a qualitative evaluation, translation was critical as it directly impacted the respondents' understanding of our questions and our understanding of the responses. As interviewers, we need to communicate with our translators in advance and manage them by giving clear guidance and instructions, including defining complex or unfamiliar concepts rather than relying on them to provide their own interpretations. We also need to communicate to our translators the types of responses that we hope to solicit with a given question, so that they can take into account the local language and local context to ask our questions in a most effective way.
- **Develop ways of articulating and restating important questions/concepts with translators before heading into the field.** Sometimes focus group participants or interviewees are not responsive to particular lines of inquiry and questions. This is particularly challenging when using an English field guide in a foreign context. We recommend that field staff develop multiple lines of

inquiry for important topics so that if one line of inquiry fails to elicit a response, another may be tried. Field staff should work with translators to make sure these lines of inquiry are culturally appropriate and semantically accurate.

- **Incorporate icebreakers into the qualitative data collection.** Group interviews and focus groups can be intimidating for the participants. Participants may not know one another and may be uncomfortable for a number of reasons. It is important for the facilitator to develop rapport with the participants, as well as for the participants to establish a sense of trust and comfort with each other. Icebreakers are one way to jumpstart this process. Without trust and comfort, participants may be unresponsive to questions or cede the floor to a dominant speaker.
- **Plan itinerary in advance.** This is important for two reasons. First, having the opportunity to research the contexts in which we would be conducting fieldwork would have made our questionnaires stronger. Second, purchasing ticket in advance would be more cost-efficient for the sponsoring organization. Third, having an itinerary would allow focus groups to be set up in advance and for us to survey more individuals.
- **Take into consideration travel contingencies.** Unexpected events can happen during travel for field visit, such as bus delays or mechanical failures. If possible, we always should try to budget extra time to account for such incidents.

III. Data Collection

Table 1: Groups Interviewed

Instrument Type	Respondent Category	Location	Number of Sessions	Total Number of Participants
Focus Group Discussions	Students	Ahore, Rajasthan; Theog, Himachal Pradesh	3	30
	Parents	Theog, Himachal Pradesh	1	6
	Teachers	Ahore, Rajasthan; Suni, Himachal Pradesh	2	10
In-depth Interviews	Students	Ahore, Rajasthan	1	2
	School principals	Ahore, Rajasthan	1	1
	Pratham project staff	New Delhi	1	3
	ASER Centre staff	Shimla, Himachal Pradesh	1	1

IV. Data Collection Instruments

Prior to conducting the interviews and FGDs, the practicum team devised interview guides tailored for each group. We present them below.

i. Focus Group: Students

Purpose: To gain understanding of the basic patterns and characteristics associated with students' use of technology both at school and at home, to hear about their evaluation of the education they are receiving, and to learn about their ideas of 21st century skills.

Introduction: Thank you for meeting with us today. We are _____, and we are students at the Johns Hopkins University in the United States. We are doing research and would like to ask you some questions about your use of technology and school and community activities.

Our conversation will last a few hours. We will be recording this session, so please speak loudly so that we do not miss your comments. Your responses will be kept confidential. Remember, you do not have to talk about anything you do not feel comfortable with.

Do you have any questions about what we have just explained? Are you willing to participate in this conversation?

Questions:

Part 1: Computer skills

First, we are going to ask you some questions about your computer usage both at school and outside of school.

1. Are there computers in your school?
 - a. If yes, do you have computers in a lab or is there a computer in your classrooms?
 - b. Do you get to use the computer? How often do you have access to them?
2. Do you receive any computer training at school, e.g. ICT lessons?
 - a. How long and how often is the training? What is taught? Do you have one-to-one computer access during the training?
3. At school, do your teachers use computers while teaching?
 - a. For what subjects? How often? In what ways (e.g. PPT presentations in class, homework assignment)?
 - b. If for homework, what kind of things are you asked to do? Do you have to do them by yourself or in a group with other students?
 - c. What are the most frequently used applications?
4. Outside of school do you have access to computers?
 - a. Where? How often? How long? What are the most frequently used applications?
 - b. What type of computer training if any have you received outside of school?
5. What about other digital devices, such as tablets and mobile phones, do you have access to them at school or at home?
 - a. How frequently? What do you use your tablet or mobile phone for the most?
6. Do you have access to the Internet?

- a. If yes, do you most frequently surf the web from computers, tablets, or mobile phones?
What do you spend the most time on?
- b. Do you use any form of social media? Which platforms? How and for what?

Part 2: 21st Century Skills (Excluding ICT)

9. What kinds of things are you asked to do in your homework?
 - a. Do you ever have to give presentations? If yes, how often?
 - b. How often do you work in groups? Do you have classroom activities where you talk to other students?
 - c. When you are in class, is it okay for you to ask a classmate a question?
10. Outside of classes, do you participate in any other activities (e.g. sports) at school?
 - a. If yes, what are they? How often?
11. In your community (it can be your village, religious community or caste community), do you participate in any activities?
 - a. If yes, what are they? How often?
12. Do you have ways to know what's going on in your community, your country, and the world?
 - a. Is it important for you to know these things? Why or why not?
13. Do you have friends who are different than you?
 - a. How are they different?
 - b. Do you have friends who have a religion different than you? Who are of a different ethnicity?
 - c. Do you find it easy to make friends with them?
14. Do you know of anyone who is creative?
 - a. What makes them creative? What do they do?
15. Do you know of anyone who is a good citizen/good person/person you would look up to?
 - a. What do they do that is good?
 - b. What words would you use to describe them?

ii. Focus Group: Parents

Purpose: To understand their views on education and 21st century skills, how their use of technology may impact on the pattern and characteristic of use of their children, and to triangulate some of the findings from discussion with students.

Introduction: Thank you for meeting with us today. We are _____, and we are students at the Johns Hopkins University in the United States. We are doing research and would like to ask you some questions about your family's use of technology and school and community activities.

Our conversation will last a few hours. We will be recording this session, so please speak loudly so that we do not miss your comments. Your responses will be kept confidential. Remember, you do not have to talk about anything you do not feel comfortable with.

Do you have any questions about what we have just explained? Are you willing to participate in this conversation?

Questions:

Part 1: Children's Usage of Technology

Now we are going to ask you some questions about your children's use of technology at home.

1. Do you have a computer at home?
 - a. If yes, does/do your child/children use computers at home?
 - b. How frequently? For how long? For what purposes?
 - c. Does your child ever use the computer for school purposes?
2. Do you have mobile phones at home? Do you have any tablets in your home?
 - a. Does your child use these devices?
 - b. Do they use these devices to access the internet?
 - c. If yes, do you know what types of activities they do on the internet?

Part 2: 21st Century Skills (Excluding ICT)

3. Outside of classes, does your child participate in any other activities, e.g. sports at school?
 - a. If yes, what are they? How often?
4. In your community (it can be your village, religious or caste community), does your child participate in any activities?
 - a. If yes, what are they? How often?
5. Are you aware of what your child is learning in school?
 - a. What kinds of things is he/she asked to do in the homework?
 - b. Does your child ever have to give presentations?
 - c. Does your child ever do homework with other students?
6. What do you think makes one a good citizen?
7. Do you have ways to know what's happening in your community, your country, and the world?
 - a. How? Does your child use these ways to know what's happening in the community, country and the world?
 - b. Is it important to you that your child knows these things? Why or why not?
8. Do you know if your child have friends who are different from them?

- a. How are they different?
- b. Do they have friends who have a different religion? Who are of a different ethnicity?
- c. Does your child find it easy to make friends with them?

Part 3: Evaluation

Now we are going to ask you some questions about your views on education.

9. What do you think are the most important skills for your child/children's success in the future?
10. To what extent are those skills being taught adequately and well in school?
 - a. Why or why not?
 - b. What would you change?

iii. Focus Group: Teachers

Purpose: To understand how technology is incorporated in school and teachers' views on education and 21st century skills, and to triangulate some of the findings from discussions with other stakeholders.

Introduction: Thank you for meeting with us today. We are _____, and we are students at the Johns Hopkins University in the United States. We are doing research and would like to ask you some questions about your use of technology in school and other aspects teaching and learning at your school.

Our conversation will last a few hours. We will be recording this session, so please speak loudly so that we do not miss your comments. Your responses will be kept confidential. Remember, you do not have to talk about anything you do not feel comfortable with.

Do you have any questions about what we have just explained? Are you willing to participate in this conversation?

Questions:

Part 1: Incorporation of Technology at School

First, we are going to ask you some questions about how you use technology, such as computers and other digital devices in your teaching at school.

1. Are there computers at your school?
 - a. Where are they located?
 - b. Do you have access to them? When?
 - c. Do students have access to them? When?
2. Are tablets available at your school? Do students have access to them?
3. Do you know of locations outside of school where students access computers/ the Internet?
4. Have you received training on the use of digital devices such as computers and tablets in the classroom?
 - a. Describe the training.
 - b. Who provided the training?
 - c. Did you feel it helped you to incorporate the use of technology in your classroom? If so, how? If not, why not?
5. Do you use computers in your teaching?
 - a. How often?
 - b. How do you use computers to teach?[NOTE: passive vs. supplementary]
6. Do you give homework assignments that require students to use computers or tablets?
 - a. Where do most of the students complete the assignment?
 - b. Are students allowed to work together? Do they?
 - c. How is the quality of the students' work on these assignments?
7. What computer skills do your students understand? What skills do your students not understand?
8. Do you feel you are able to fully utilize these computers and tablets? If not, what could be improved so that they are fully utilized?

Part 2: Students' 21st Century Skills (Excluding ICT)

Now we will ask you some questions about some of the other aspects of 21st century skills.

9. Are there students of different ethnicities or backgrounds at your school?
 - a. To what extent do they interact with each other?
 - b. To what extent do you conduct activities to enhance interactions and exchanges between them?
10. Outside of classes, does your school also offer any other activities, e.g. sports, to students?
 - a. What are they? Do students actively participate in them?
11. What are the kinds of things you ask students to do in the homework?
 - a. Can students work together on schoolwork?
12. Are students ever asked to present work to the class?
13. Have you seen any instances of creativity and innovation from the students?
 - a. What are they?
14. Do you have any creative students?
 - a. What makes them creative?
15. Are there any activities at school to promote creativity and innovation?
 - a. What are they?
16. Citizenship consists of local citizenship (knowledge of civil rights, institutions, key figures of the country, participation in community activities) as well as global citizenship (knowledge of main events in world history, sense of belonging to the world, cross-cultural awareness and competence). Are there any activities at your school that promote citizenship?
 - a. What are they?

Part 3: Evaluation

Lastly we would like to know your opinion on skills that may be relevant for educational improvement in the Indian context.

17. What do you think are the most important skills for your students' success in the future?
18. How do you think these skills can be integrated into the school curriculum to achieve maximum results?

iv. Focus Group: School Principals

Purpose: To understand from administrators' views on education and 21st century skills, how the use of technology in their schools may impact the pattern and characteristic of use of students, and to triangulate some of the findings from discussions with other stakeholders.

Introduction: Thank you for meeting with us today. We are _____, and we are students at the Johns Hopkins University in the United States. We are doing research and would like to ask you some questions about the incorporation of technology and other aspects of teaching and learning at your school.

Our conversation will last a few hours. We will be recording this session, so please speak loudly so that we do not miss your comments. Your responses will be kept confidential. Remember, you do not have to talk about anything you do not feel comfortable with.

Do you have any questions about what we have just explained? Are you willing to participate in this conversation?

Questions:

Part 1: Incorporation of Technology at School

First, we are going to ask you some questions about how your school employs technology, such as computers and other digital devices, in the teaching/learning process.

1. Are there computers at your school?
 - a. Where are they located?
 - b. Do teachers have access to them? When?
 - c. Do students have access to them? When?
2. Are tablets available at your school? Do teachers and students have access to them?
3. Is there any training provided to you and/or teachers in the use of these digital devices in education?
 - a. Describe the training.
 - b. Who provided the training?
 - c. Did you feel it helped your teachers to incorporate the use of technology in the classroom?
If so, how? If not, why not?
4. Do you think learning to use computers and tablets should be a part of the curriculum?
 - a. If yes, why? If no, why not?
 - b. In what ways do you think computers and tablets should be a part of the curriculum?
 - c. In what ways are computer and tablet skills a part of the curriculum now?
5. Has there been any effort to assess students' digital literacy at your school?

Part 2: 21st Century Skills (ICTs excluded)

6. Are there activities outside of the classroom (such as sports) that are an important aspect of your school's education?
 - a. What are they? In what ways does the administration support these activities?
 - b. What is the participation level of students and teachers (if relevant)?
7. Do you have any creative students?
 - a. What makes them creative?
8. Are there any activities at school to promote creativity and innovation?

- a. What are they?
9. [for urban schools only] Has there been any effort to assess students' creativity and innovation?
10. [for urban schools only] Has there been any effort to assess students' problem solving and critical thinking?
11. Are there students of different ethnicities or backgrounds at your school?
 - a. To what extent do they interact with each other?
 - b. Does your school conduct activities to enhance interactions and exchanges between them?
12. Citizenship consists of local citizenship (knowledge of civil rights, institutions, key figures of the country, participation in community activities) as well as global citizenship (knowledge of main events in world history, sense of belonging to the world, cross-cultural awareness and competence). Are there any activities at your school that promote citizenship?
 - a. What are they?

Part 3: Evaluation

Lastly we would like to know your opinion on skills that may be relevant for educational improvement in the Indian context.

13. What do you think are the most important skills for your students' success in the future?
14. Do you feel these skills are addressed in the current curriculum?
 - a. How do you think these skills can be integrated into the school curriculum to achieve maximum results?
15. In your opinion, what are the most effective approaches in assessing these skills?
16. What changes in external factors, such as the policy environment and government support, do you think would be helpful to achieve maximum results in developing these skills?

vi. Key Informant Interview: Pratham/ASER Centre project staff (ICT Intervention)

Purpose: To understand the role of Pratham/ASER Centre in the promotion of 21st century skills, obstacles it might have faced, and the plans moving forward.

Introduction:

Thank you for meeting with us today. We are _____, and we are students at the Johns Hopkins University in the United States. We are doing research and would like to ask you some questions about your interaction with the schools in your community, particularly in the area of technology.

Our conversation will last a few hours. We will be recording this session, so please speak loudly so that we do not miss your comments. Your responses will be kept confidential. Remember, you do not have to talk about anything you do not feel comfortable with.

Do you have any questions about what we have just explained? Are you willing to participate in this conversation?

Questions:

Description of Intervention

1. Please elaborate on some important features of your project.
 - a. In what geographical locations and who are the primary targets?
 - b. What technological inputs (i.e. tablets, laptops) are provided?
 - c. Do Pratham/ASER provide any training or continued support to teachers and/or students on the use of these technological inputs? If so, please describe the nature and frequency of this training/support.
 - d. How are these projects monitored and evaluated?
 - e. Have you developed any tools/strategies for assessing students' progress?
2. What are the principal intended outcomes of your ICT project?
 - a. Does the project target digital literacy, creativity, innovation and collaboration, etc.?
 - b. If yes, describe the project. How do you assess it?
3. What do you see as the proper role of technology in education? And the role of teachers and/or students vis-a-vis technological inputs?
 - a. Do you do this in your ICT project? Why or why not?
4. Do schools seem to be using inputs (i.e. tablets, laptops) effectively and efficiently?
 - a. What improvements in what educational outcomes have been observed, if any?
 - b. Is there anything that could be done to improve their effectiveness?
5. What challenges have you faced with the project?
6. Are you familiar with programs at similar education-focused NGOs that work on students' digital literacy in India?

v. Key Informant Interview: Pratham/ASER Centre project staff (Other Intervention)

Purpose: To understand the role of Pratham/ASER Centre in the promotion of 21st century skills, obstacles it might have faced, and the plans moving forward.

Introduction:

Thank you for meeting with us today. We are _____, and we are students at the Johns Hopkins University in the United States. We are doing research and would like to ask you some questions about your interaction with the schools in your community, particularly in the area of technology.

Our conversation will last a few hours. We will be recording this session, so please speak loudly so that we do not miss your comments. Your responses will be kept confidential. Remember, you do not have to talk about anything you do not feel comfortable with.

Do you have any questions about what we have just explained? Are you willing to participate in this conversation?

Questions:**Description of Intervention**

1. Would you please describe for us your project?
 - a. In what geographical locations and who are the primary targets?
 - b. What skills do you target?
 - c. What is the method for intervention?
 - d. What are the principal intended outcomes of your project?
2. How do the targeted skills align with the school curriculum?
3. What challenges have you faced with the project implementation?
4. Have you developed any tools/strategies for assessing students' progress?
5. What challenges have you faced with using these tools for evaluation?
6. Are you familiar with programs at similar education-focused NGOs that work on similar skills in India?

V. Agenda

Day 1 (12 January): New Delhi

- Go to ASER Delhi office, meet ASER staff
- Attend demonstration of new ASER mobile app
- Review questionnaires with ASER staff and Melissa Goodnight
- Attend evening event with country-wide ASER staff

Day 2 (13 January): New Delhi

- Attend launch of 10th annual Annual Status of Education Report
- Review comments on questionnaires

Day 3 (14 January): New Delhi

- Attend panel discussions on the Report

Day 4 (15 January): New Delhi

- Interview ASER life skills project staff
- Meet with ASER staff to review questionnaires and field visit agenda

Day 5 (16 January): New Delhi

- Finalize questionnaires
- Travel to Shimla (Himachal Pradesh)

Day 6 (17 January): Shimla

- Visit Upper Primary Programme (Life Skills)
- Life Skills classroom (English) observation
- 2 FGDs with students
- Key Informant Interview with Pratham project staff

Day 7 (18 January): Shimla

- Visit Upper Primary Programme (Life Skills)
- FGD with parents

Day 8 (19 January): Shimla

- Visit LOTB Programme (Digital Literacy)
- FGD with teachers

Day 9 (20 January): New Delhi

- Debrief with ASER Centre

Day 10 (21 January): Ajmer - Ahor

- Travel to Ajmer - Ahor

Day 11 (22 January): Ahor

- Visit POS/Upper Primary Programme in 2 locations (Life Skills)

- Key Informant Interview with school principal
- Key Informant Interview with teachers
- FGDs with students
- Life Skills classroom (Maths) observation
- Key Informant Interview with students
- Visit Pratham Open School program

Day 12 (23 January): Ahor

- Travel back to Ajmer and then New Delhi

Day 13 (24 January): New Delhi

- Debrief with ASER staff

Day 14 (25 January)

- Return to DC

21st Century Skills and Digital Literacy: An India Case Study

Memo on Findings and Recommendations

SAIS-ASER Centre Practicum: 2014-2015

Jacob Morrin | Olivia Huang | Ryan Whalen

I. EXECUTIVE SUMMARY

Currently, the development of 21st century skills in rural government schools in India is uneven. Some skills, such as digital literacy, receive more attention as part of the standard ninth through twelfth grade curricula, compared to creativity and collaboration, for example. Details on our findings by skill category are found below.

- **Students have access to computers and learn operational skills, but rarely use them to search, evaluate, use and present information.**
- **There is limited access to the Internet. Some students access the Internet on their mobile phones but not for educational purposes.**
- **Students have opportunities to participate in extracurricular and community activities.**
- **There are limited opportunities for student presentations and collaborative work.**
- **Whether for semantic or cultural reasons, assessing creativity is a challenge. There is large variation in the responses we received.**
- **While there is no formal class on citizenship education, some extracurricular and community activities do promote local citizenship.**
- **There is a consensus that 21st century skills are important for the future, but teachers and parents also want to see more vocational training and a curriculum tailored to each student's abilities.**
- **Assessment of 21st century skills (i.e. "life skills") is time-intensive and requires a focused approach with a skilled assessor.**

Based on these findings, our basic recommendations for moving forward are (more details in section IV):

- **ASER should not endeavor to assess *all* 21st century skills.** This skillset is too broad, and many of the skills are "soft" and difficult to measure with validity.
- **ASER should determine whether it wants to focus on inputs or outcomes.** Inputs will be easier to measure, but outcomes may be more informative.
- **For some 21st century skills, a quantitative assessment may not be appropriate.** Many 21st century skills are "soft" skills and require a qualitative assessment.
- **In the future, ASER should leverage the launch of the ASER app to assess 21st century skills.** An app and a tablet are flexible tools that may enable ASER to develop innovative ways of assessing soft skills.

II. CONTEXT

From January 12, 2015 to January 25, 2015, a group of three consultants from the Johns Hopkins University School of Advanced International Studies (SAIS) traveled with ASER staff to conduct interviews with thirty-two students, ten teachers, one school administrator, and six parents in four rural government schools, two in the state of Himachal Pradesh and two in the state of Rajasthan. We also interviewed Pratham staff in New Delhi and Ahore, Rajasthan. The goal of our interviews was to conduct a limited assessment of the state of 21st century skills in India and explore how ASER can incorporate an assessment of 21st century skills into its annual assessment.

III. DETAILED FINDINGS

Status of 21st Century Skills in Indian Schools

Based on our limited sample size, we find that some aspects of 21st century skills are better incorporated into the school curriculum than others in rural government schools. Digital literacy, for instance, is part of the standard ninth through twelfth grade curricula, whereas creativity and collaboration have yet to receive adequate attention in school.

Digital Literacy

Three of the four schools we visited have functioning computer labs—a positive finding—however, there is wide variation in the use of computers in instruction. In some schools, students rarely use computers for more than simple applications such as Paint, whereas in other schools, teachers and students report the use of Microsoft Office applications such as Word and Excel in class. Even in cases where students are using more advanced applications, the focus is on basic operational skills. Apart from one case in which students are asked to find articles on the Internet for English class, students are rarely asked to apply these digital tools to gather, evaluate, use and present information in homework assignments or term projects.

There is limited access to the Internet in general. However, some students report using mobile phones to access the Internet, which is corroborated by the teachers' account of seeing social media profiles of their students. However, none of the students report using mobile phones for educational purposes.

Extracurricular and Community Activities

All the schools we visited report offering sports at school and participate in local and regional academic competitions, which often include cultural and citizenship elements, such as essays on human rights. Regarding community activities, parents in Theog report that children regularly take part in informal community activities such as tree planting and village cleaning. In Rajasthan, community activities appear to be more formal and organized. Some schools report having a Boy Scouts program through which students could participate in community activities and learn life skills. Other schools have weeklong community activities around Socially Useful Productive Work (SUPW) which includes cleaning the school and temples. However, student participation in extracurricular and community activities is not obligatory and depends on self-motivation.

Communication and Collaboration

Most teachers report allowing time in class for student presentations, a finding which is confirmed in student interviews. However, the presentations are rarely of the students' original work and typically consist of recitation of an existing piece of literature or working out a math problem on the board. In Rajasthan,

however, students report that they present term projects from their science class, which consist of a model built based on instructions given in a book.

Opportunities for collaboration in the classroom are quite limited. In one school, teachers report that they provide opportunities for group work about one to three times per week in each of their classes. In other schools, group work is either very rare or nonexistent. Interviewees provide a variety of reasons for this trend. Pratham project staff in New Delhi observe that teachers are often concerned about high noise levels in their classrooms and therefore do not assign group work. Teachers in Rajasthan offer a slightly different explanation, citing the limited time available for instruction and the difficulty they have in completing the required syllabus as the primary barrier to group work in the classroom. Outside of the classroom, both teachers and students indicate that students are generally allowed to work with classmates on homework assignments, and children often collaborate with relatives and/or neighbors in the same class to work on homework.

Creativity and Innovation

The assessment of creativity and innovation presented the greatest challenges during our field visits. When asked about creativity, nearly all respondents were slow to answer and required significant prodding. The meaning of 'creativity' appears to present particular problems for respondents, many of whom have different understandings of the term. Teachers across all schools and the school principal in Ahore concur that creative students are the ones who are “disciplined” and “obedient.” Parents in Theog opine that creativity is rooted in “problem-solving” in the household. Students in Ahore, when asked to describe the best term project for their science class, report that one project was the best because it was “resourceful” in using recycled materials.

In terms of promoting creativity at school, students report few activities that foster creativity, although the local and regional competitions and the term projects for science class appear to present promising outlets for promoting creativity.

Citizenship

Parents and teachers agree that a good citizen is one who is “well-mannered”, “disciplined”, “curious”, “responsible” and who has “self-control”. While there does not appear to be a class specifically on citizenship education (such as the Social Studies class in the American school system), the extracurricular and community activities mentioned above, such as human rights poster making and essay writing competition offer potential opportunities to promote citizenship indirectly. Additionally, every school has a student parliament (although some are inactive), and in bigger schools, such as block-level model schools, a National Service Scheme is implemented.

Important Skills for the Future

We received a wide variety of responses from parents, teachers, and the school principal with regards to skills that are important for students' futures. Many mention that the curriculum and instruction should be aligned with the needs and abilities of students, a finding that was echoed by MIT economist Abhijit Banerjee in his address at the 10th Annual ASER launch. Parents and teachers both mention English, public speaking, problem solving, and particularly ICT skills—broadly encompassing 21st century skills—as key for their students' futures. Some respondents mention the importance of soft skills such as honesty, sincerity, and diligence.

Another important skill domain that teachers mention, and one that does not fall clearly under 21st century skills, is vocational training. Teachers in both Himachal Pradesh and Rajasthan indicate that the

school curriculum could be improved by incorporating region-specific and income-generating vocational training in areas such as agriculture, handicrafts-making, and entrepreneurship.

Assessment of 21st Century Skills

Pratham staff emphasize the fact that assessing life skills—many of which overlap with 21st century skills—is resource-intensive, particularly with respect to staffing needs, training, and time. Life-skills assessors typically spend up to five days doing an assessment of a single class. Assessors spend three days observing students in order to establish a baseline. Once the assessor has established a baseline, s/he must then facilitate a group intervention and conduct a one-on-one activity with each of the students. The process is time-intensive and requires a skilled assessor.

Training skilled assessors is another challenge, however. Assessors must be adept at conducting the interventions and at objectively appraising the nuances of 21st century skills. To mitigate the inherent subjectivity in assessing 21st century skills, Pratham staff have created a rubric in the form of a five-by-five matrix. While the rubric has allowed assessors to hone in on a small set of skills, Pratham staff report challenges in training assessors to use the rubric in a consistent manner. They also state that the use of the tool was burdensome on the trainers.

IV. RECOMMENDATIONS

Given that ASER is looking to use its existing survey model—cheap, fast, inexpensive, and reliant on volunteer assessors—there are a few lessons learned from our fieldwork:

- **ASER should not endeavor to assess all 21st century skills.** Rather, ASER should focus in on the three to five 21st century skills it deems most important, keeping in mind that some 21st century skills require time, observation, and an intervention. Measuring some aspects of collaboration, for example, would require a group setting and most likely some type of intervention.
- **ASER should determine whether it wants to focus on inputs or outcomes.** Inputs will be easier to measure, but outcomes may be more informative. For example, a potential question to a student could be how many group projects they have participated in within a specific time frame (which is an input), but the answer to this question will not tell you how well students collaborate (which is the intended outcome).
- **For some 21st century skills, a quantitative assessment may not be appropriate.** Related to the decision whether to focus on inputs or outputs, while some 21st century skills lend themselves well to quantitative measurement, others require qualitative evaluation. For example, there are some informative digital literacy input indicators such as number of people who have access to or have used a computer in the past six months. Other 21st century skill outcomes—namely, creativity, collaboration, and citizenship—may be better assessed with qualitative tools.
- **In the future, ASER should leverage the launch of the ASER digital application (app) to assess 21st century skills.** The launch of the ASER app has expanded the menu of survey tools available to ASER. Most of the challenges noted in this report are the result of limitations on the survey tools. The flexibility of apps and tablets, however, could empower ASER to use innovative assessment tools, such as games, interactive stories, or pictures, to see if students can identify a

keyboard, for example. Expansion of the app to include other survey domains is an area ASER should continue to explore.

Appendix I: Raw Data

- i. [Click here to access a Google Drive folder containing notes and recordings of interviews and focus groups.](#)
- ii. [Click here to access a Google Docs spreadsheet containing a spreadsheet with our data analysis.](#)

21st Century Skills and Digital Literacy: An India Case Study

Competency Grid

SAIS-ASER Centre Practicum: 2014-2015

Jacob Morrin | Olivia Huang | Ryan Whalen

Based on our findings from the qualitative instrument and the construction of our quantitative survey, ASER requested that we develop a competency grid categorizing each of the 21st century skills and creating standards with corresponding achievement indicators for each skill. The skills fell broadly under the following domains: digital tools, social interaction, and individual action. Since ASER has not been able to pilot the indicators identified in the grid to test for validity and reliability, ASER has requested that SAIS not publish the competency grid at this time.

21st Century Skills and Digital Literacy: An India Case Study

Sample Quantitative Survey for Secondary School Students

SAIS-ASER Centre Practicum: 2014-2015

Jacob Morrin | Olivia Huang | Ryan Whalen

Based on our findings from the qualitative instrument, we developed a quantitative survey for ASER Centre to pilot that measures various inputs and outcomes related to 21st century skills. The survey was divided into four sections: digital literacy, extracurricular and community activities, communication and collaboration, and citizenship. Digital literacy was further divided into the following subsections: access to computers, self-reported computer literacy, self-reported mobile phone literacy, and sample digital skills test. Since the survey has not been piloted and ASER has not been able to confirm the validity and reliability of the survey, ASER has requested that SAIS not publish the survey at this time.

21st Century Skills and Digital Literacy: An India Case Study

Literature Reviews

SAIS-ASER Centre Practicum: 2014-2015

Jacob Morrin | Olivia Huang | Ryan Whalen

Definitions

We organize 21st century skills into four categories: ways of thinking; ways of working; tools for working; and living in the world. Within these categories, we delineate and elaborate specific skills. Useful for grounding the discussions on 21st century skills that proceeds.

Impact Evaluations

We aggregate literature relating to impact evaluations on interventions that focus on digital literacy and 21st century skills.

Assessments

In this section we focus on compiling literature around assessing 21st century skills and digital literacy.

Assessment Approaches

In this section we focus on compiling literature around approaches to assessing 21st century skills and digital literacy.

Caitlin Moss's Literature Review

As requested by ASER, we have condensed Caitlin Moss's 2014 literature review on ICT interventions in education into a spreadsheet.

According to a study conducted by Marilyn Binkley, Ola Erstad, Joan Herman, Senta Raizen, Martin Ripley, May Miller-Ricci, and Mike Rumble, 21st Century Skills can be categorized into four basic group **Ways of Thinking, Ways of Working, Tools for Working, and Living in the World.**

Below we present definitions of each skill according to their categories. More detailed definitions of the different skills can be found in the source listed below the table.

Type of Skill	Skill Indicators
Ways of Thinking	
Creativity and Innovation	<ul style="list-style-type: none"> a) Create new and worthwhile ideas (both incremental and radical concepts) b) Be able to elaborate, refine, analyze, and evaluate one's own ideas in order to improve and maximize creative efforts c) Know a wide range of idea creation techniques (i.e. brainstorming) d) Be aware of and understand where and how innovation will impact and the field in which the innovation will occur e) Be open and responsive to new and diverse perspectives and incorporate group input and feedback into the work
Critical Thinking, Problem Solving, and Decision-Making	<ul style="list-style-type: none"> a) Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems b) Effectively analyze and evaluate evidence, arguments, claims, and points of view c) Understand systems and strategies for tackling unfamiliar problems d) Ask meaningful questions that clarify various points of view and lead to better solutions
Learning to Learn, Metacognition	<ul style="list-style-type: none"> a) Knowledge and understanding of one's preferred learning methods and the strengths and weaknesses of one's skills and qualifications b) Knowledge of available education and training opportunities and how different educational decisions lead to different careers c) Effective self-management of learning and careers in general d) Ability to reflect critically on the object and purpose of learning
Ways of Working	
Communication	<ul style="list-style-type: none"> a) Awareness of societal conventions and cultural aspects and the variability of language in different geographical, social and communication environments b) Ability to communicate, in written or oral form, and understand, or make others understand, various messages in a variety of situations and for different purposes c) Disposition to approach the opinions and arguments of others with an open mind and engage in constructive and critical dialogue d) Sensitivity to cultural differences and resistance to stereotyping e) Confidence when speaking in public

<p>Collaboration (Teamwork)</p>	<ul style="list-style-type: none"> a) Know when it is appropriate to listen and when to speak b) Know and recognize the individual roles of a successful team and know own strengths and weaknesses, and recognizing and accepting them in others c) Know how to plan, set, and meet goals and to monitor and re-plan in the light of unforeseen developments d) Speak with clarity of awareness of audience and purpose e) Listen with care patience, and honesty f) Show respect for cultural differences and be prepared to work effectively with people from a range of social and cultural backgrounds g) Respond open-mindedly to different idea and values
<p>Tools for Working</p>	
<p>Information Literacy</p>	<ul style="list-style-type: none"> a) Access information efficiently and effectively and evaluate information critically and competently b) Ability to search, collect and process information, data and concepts and to use them in a systematic way c) Ability to use appropriate aids, presentations, graphs, charts and maps to produce, present, or understand complex information d) Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information e) Positive attitude and sensitivity to safe and responsible use of the Internet, including privacy issues and cultural differences
<p>ICT Literacy</p>	<ul style="list-style-type: none"> a) Understanding of the main computer applications, including word processing, spreadsheets, databases, information storage and management b) Awareness of the opportunities given by the use of Internet and communication via electronic media and the differences between the real and virtual world c) Use technology as a tool to research, organize, evaluate, and communicate information accurately and honestly with respect for sources and audience d) Use information accurately and creatively for the issue or problem at hand respecting confidentiality privacy, and intellectual rights e) Be open to new ideas, information, tools, and ways of working but evaluate information critically and competently f) Be able to open software, sort out and save information on the computer; download different types of information from the Internet
<p>Living in the World</p>	

<p>Citizenship - Global and Local</p>	<p>a) Understand democratic concepts, institutions, key figures at the local, national and international level b) Know the main events and trends in national and world history, and the movements of peoples and cultures c) Participate in community activities and decision-making at national and international levels d) Sense of belonging to one's locality, country, and world e) Accept the concept of human rights, equality, and appreciate differences between value systems</p>
<p>Life and Career</p>	<p>a) Adapt to change and be flexible b) Manage goals and time c) Be self-directed learners d) Manage projects and produce results e) Interact effectively with, guide and lead others</p>
<p>Personal and Social Responsibility</p>	<p>a) Know codes of conduct generally accepted or promoted in different societies b) Communicate constructively in different social situations and be willing to negotiate and compromise c) Understand the different viewpoints caused by diversity and contribute one's views constructively. d) Overcome stereotypes and prejudices and show interest in and respect for others e) Maintain a degree of separation between the professional and personal spheres of life and express frustration in a constructive way</p>

Source: Marilyn Binkley, Ola Erstad, Joan Herman, Senta Raizen, Martin Ripley, May Miller-Ricci, and Mike Rumble. "Defining 21st Century Skills." In Assessment and Teaching of 21st Century Skills, edited by Patrick Griffin, Barry McGaw, and Esther Care, 17-66.

Review of RCTs of Digital Literacy Projects

Authors	Year	Article Title	Country	Treatment	Indicators & Measures (e.g. examples of questions, useful indicators)	Findings (i.e. what was the impact of the intervention?)	Notes	Link
Dietmar W. Beuermann Julian P. Ochoa Yessira Cruz-Aguayo Santiago Casilo Ofer Malamud	2012	Home Computers and Child Outcomes: Short-Term Impacts from a Randomized Experiment in Peru	Peru	* RCT at both school and individual level: 14 treatment schools (and 14 control schools) randomly selected from a sample of low-achieving public primary schools; within treatment schools participating students randomly selected through public lottery to receive OLPC XO laptops * In total 1048 laptops distributed to treatment students in treatment schools	* Three assessments of computer skills were administered: - An objective test that measure the proficiency in using an OLPC XO laptop - A multiple-choice test consisting of five questions intended to measure practical knowledge about using a Windows personal computer (PC) and Internet - A set of 11 (yes/no) subjective questions in which students were asked to report whether they could perform various tasks related to using a PC and Internet	* An extremely large positive effect of intervention on the items testing XO-specific laptop knowledge: effect equals to 0.88 s.d. * No significant differences between treatment and control students in either tests aimed at measuring skills related to using a PC and Internet	* The assessment instruments developed by the study's authors are available upon request	http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=37360509
Germin Bot Julian Casilo Pablo Ibarra	2014	The Effects of Shared School Technology Access on Students' Digital Skills in Peru	Peru	* Measured effect of high student access to a shared computers and increased internet access in school on digital skills * Propensity score matching method with 202 schools (101 treatment schools with relatively high computer availability and Internet access and 101 control schools with relatively low computer availability and Internet access)	* Design of the test involved four steps: - Areas and competencies to evaluate were determined based on a syllabus used by International Computer Driving License, the exam evaluated basic skills and file management, word processing, operating spreadsheets, and information and communication - About 210 items were developed that emphasized the practical skills in operating computers and the Internet - A pilot application involving 500 students was implemented in schools in Lima similar to those participating in the study - Results from the pilot application were analyzed and standard procedures were applied to select those items that satisfy desired psychometric properties * The resulting test included 54 items and students were expected to complete it in one hour * Conducted interviews of 3,354 households	* Statistically significant positive impacts on digital skills: students in the treatment group outperform those in the control group by 0.31 s.d.	* A computer-based exam was desired but was not feasible because some participating schools did not have the required resources; a field validation exercise was conducted in which selected secondary students in Santiago were asked to complete both this paper test and the computer-based ICDL test and results indicated that this paper test is both valid and reliable	http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=38351933
Ofer Malamud Cristian Pop-Eleches	2010	Home Computer Use and the Development of Human Capital	Romania	* Regression discontinuity design: a unique government program in Romania which allocated vouchers for the purchase of a home computer to low-income children based on a simple ranking of family income	* Administered a computer test and elicited self-reported computer fluency: - computer fluency test contained 12 multiple-choice questions intended to capture a measure of computer skills; - Self-reported computer fluency was obtained by asking children to report on their knowledge of different tasks related to operating a computer and using applications, as well as email and Internet use * These questions are based on a computer-email-web (CEW) fluency scale by Bunz (2004)	* Children in households who won a voucher had significantly higher scores in a test of computer skills and in self-reported measures of computer fluency, with effect sizes of about 1/3 s.d.	* Data appendix contains a full description of the computer test and the full set of computer fluency questions	http://www.nber.org/papers/w15814.pdf
Di Mo John Swinnen Linbo Zheng Hongmei Yi Qinghe Qu Matthew Rosewell Scott Rozelle	2013	Can One-to-One Computing Narrow the Digital Divide and the Educational Gap in China? The Case of Beijing Migrant Schools	China	* 150 grade three students in 13 migrant schools in greater Beijing were given laptops through the One Laptop Per Child (OLPC) program * 150 students assigned to treatment group, 150 students assigned to control group	* Students were asked a set of eight questions on basic computer operations, such as whether the student knew how to turn on/switch off the computer, use the keyboard, use the mouse, etc., then the authors generated eight dummy variables and took the normalized mean to create the indicator of student computer competency (standardized computer skill scale)	* This OPLC-like program improved student computer skills by 0.53 s.d.	* Table 8 in the appendix provides the full list of questions asked	http://www.sciencedirect.com/science/article/pii/S0305750X13000777
Edya Quellmalz Daniel Zaiss	2000	World Links for Development (WorldL): Student Assessment Uganda Field Test	Uganda	* Treatment consists of five components: - Internet connectivity for secondary schools in developing countries - Training and educational content to promote economic and social development - Regional and global partnerships with public, private and non-governmental organizations - Telecommunications policy advice for the education sector - Monitoring and evaluation support * Six World Links schools and four comparable non-World Links schools in Uganda. There were a total of 200 students assessed, 121 from World Links schools and 79 from non-World Links schools.	* Assessment focused on ICT skills and the use of ICT to search for, organize, and communicate information, the SRI team identified key skill components for three outcome areas: reasoning with information, communication, and technology use. * The developed student assessment had three parts: - Part 1: a background questionnaire that asked students to report how frequently over the prior year they engaged in classroom activities that were related to the three outcome areas. E.g. students were asked to describe the settings in which they used computers and the internet and the types and frequencies of technology use, rate the extent to which they liked using technology for various purposes and how autonomously they could use computers for a variety of purposes. - Part 2: presented students with questions and tasks requiring use of technology in brief, project-based learning activities. Two assessment forms were developed: In both forms, students were asked to write a newsletter for other students about the plight of two endangered species. Form 1 contained a series of constructed response questions. Students gathered information from Web pages about two endangered species, specified a line of inquiry for further research and a Web search query phrase, then prepared a news article making evidence-based predictions about the likelihood that the two species would survive. Students were also asked to insert and annotate a relevant graphic. Form 2 prompted students to demonstrate the same skills. However, with some exceptions, including the news article task, most of the Form 2 questions were multiple choice. - Part 3: presented students with follow-up questions about their reactions to the forms. * Students' constructed responses were rated according to a scoring rubric that specified criteria for responses to questions eliciting evidence for each of the outcome areas: technology use, reasoning with information, and communication.	* Assessment data indicate that students in WorldL schools are becoming proficient in fundamental uses of technology promoted by the WorldL Program. * The WorldL student assessment data also provide evidence that students in WorldL schools out-perform students in non-WorldL schools on tasks calling for reasoning with information and communication (technology use data was not collected in non-WorldL schools).	* Detailed rubrics and illustrative examples of student work in the appendix	http://www.art.com/work/publications/world-links-development-student-assessment-uganda-field-test-2000

Review of Assessments on 21st Century Skills

Author	Year	Article Title	Country	Objectives	Indicators & Measures (e.g. examples of questions, useful indicators)	Findings	Link
Center of Studies on Information and Communication Technologies	2012	Survey on Internet Use by Children in Brazil - ICT Kids Online Brazil 2012	Brazil	<ul style="list-style-type: none"> To investigate the opportunities and risks associated with Internet use by Brazilian children between the ages of 9 and 16 The Brazilian Internet Steering Committee (CGL.br) decided to conduct the ICT Kids Online survey, carried out in Brazil for the first time in 2012. 	<ul style="list-style-type: none"> Key indicators included: <ul style="list-style-type: none"> Proportion of children who have their own social networking profile Perception of children regarding their internet skills (knows more about the internet than their parents, knows a lot of things about using the internet, etc.) Internet skills of children (bookmark a website, block messages from someone, find information on how to use the internet safely, change privacy settings on a social network profile, etc.) 	<ul style="list-style-type: none"> 85% of 10-15 year olds in Brazil use the Internet at least once a week. Strong evidence of digital divide in Brazil based on wealth and socioeconomic status 16-18 year olds in Brazil tend to use social networking sites significantly more than their counterparts in Europe While many Brazilian children reported knowing many things about navigating the Internet, the authors indicate that a significant proportion of Brazilian youth have not mastered the skills for Internet privacy and safety 	http://ctic.br/media/docs/publicacoes/2/ict-kids-online-2012.pdf
Mission Measurement	2014	Measuring Creativity: Adobe Youth Voices (AYV) Case Study	Worldwide	<ul style="list-style-type: none"> Main objective of study: Measure the effectiveness of the Adobe Youth Voices (AYV) program, a large-scale initiative to cultivate creativity in youth by providing partner organizations with funding, curriculum, software, training, and technical assistance Objectives of the AYV program include: <ul style="list-style-type: none"> Increase youth understanding of importance of creative confidence Increase youth ability to use media to express themselves Increase creative confidence in youth Increase youth application of creative confidence in education, career, or community engagement 	<ul style="list-style-type: none"> Indicators for Mission Measurement's AYV evaluation are largely self-reported by students and include: <ul style="list-style-type: none"> Tried harder to succeed in school (Educational indicator) Taken steps to apply to college/university (Educational indicator) Learned career skills (Career indicator) Thought more about the type of career they want to have (Career indicator) Volunteered outside of AYV (Community indicator) Learned more about an issue within their community (Community indicator) 	<ul style="list-style-type: none"> Key takeaway: educators are fostering more than media-making skills, they are supporting skill development that can be used outside the program 50% of youth practiced brainstorming, more than 60% selected their audience and revised their work 87% of youth reported being confident or somewhat confident across the 5 creative confidence dimensions 50% of youth reported that their participation in the AYV program changed their behavior in their school, career, and/or community life. 	http://missionmeasurement.com/uploads/documents/Measuring_the_Case_for_Creativity.pdf
Ana Lídia D'Imperio Lima	2012	Using ICT in Education: Digital Inclusion or Exclusion	Brazil	<ul style="list-style-type: none"> Use data from the Brazilian Internet Steering Committee's 2011 ICT Education Survey to identify indicators to understand the degree of adequacy (teacher qualification) necessary for the teaching-learning process to contribute to the development of digital literacy skills Begin with public schools, from pre-school to secondary level 	<ul style="list-style-type: none"> Indicators for Teachers of Digital Literacy Classes: Access to ICT at home; daily use of computer/Internet; mobile access; ICT usage at school; ICTs adequate to fulfil personal needs; ability to search for resources on the Internet; is editing text or preparing presentations considered a mastered skill; difficulty participating in social networks; use of forums and/or distance-learning; participation in ICT training/course; can colleagues solve doubts about the use of ICT in school Indicators for Administration and Guidance: Classroom activities that promote access to computers and the Internet; activities take place in a lab or in classroom; use of Internet as a research tool for lesson plans; information, audio-visual elements, to favor student learning; use of Internet for communication with colleagues; teachers take part in discussion groups each day; collaborative practices online 	<ul style="list-style-type: none"> From the ICT Education survey, the researchers were able to draw the broadest set of indicators for teachers of digital literacy classes, and to a lesser extent for administration and guidance. Could not identify indicators for a teacher as a model student. Data from the ICT Education survey indicates that Brazil is making advancements in ensuring full and equal inclusion of students in the digital world, but authors would like the article to start a dialogue on the creation of a more comprehensive indicator for the field of education and digital inclusion 	http://www.ctic.br/media/docs/publicacoes/2/ict-educacao-2012.pdf
Marlyne Blakely, Ole Eriksen, Jean Herman, Dennis Raboin, Martin Ripley, May Miller-Ploot, and Mike Rumbold	2012	Defining Twenty-First Century Skills	NA	<ul style="list-style-type: none"> Understand research on the role of standards and assessment in promoting learning Describe the nature of assessment systems that can support changes in practice and use them to develop guiding principles for the design of next generation assessments Illustrate the use of technology to transform assessment systems and learning Propose a model for assessing 21st century skills 	<ul style="list-style-type: none"> Ways of Thinking <ul style="list-style-type: none"> Measuring innovation requires an interactive environment and is difficult to assess in short periods of time. Difficult to assess creativity, but digital cameras and new software tools make it easier for students to show their world and reflect on it. England's DfE "World Class Tests" make creative use of computer technology for assessments of students' thinking and ability to apply a range of techniques to solve novel and unexpected problems Ways of Working <ul style="list-style-type: none"> Communication is assessed through presentations, video presentations, but need to incorporate new mediums for communication such as Facebook and SMS Collaboration can be assessed by looking at how respondent interacts with pre-programmed virtual partners and observing how respondents interact with other group members Tools for Working <ul style="list-style-type: none"> Indicators can include: ownership and access to personal computers, quality of internet access available to respondent (speed), access to internet via mobile phone For ICTs, need range of tests that assess: basic skills such as opening software, navigation, downloading, searching, classifying, integrating, evaluating, communicating, cooperating, and creating Living in the World <ul style="list-style-type: none"> Focus has been on knowledge about democratic processes For citizenship, indicators include: knowledge of civil rights in the home country, institutions, key figures, concepts such as democracy, main events in local and world history. Also need to look at participation in community activities and ability to profit from government programs For attitudes, indicators include: sense of belonging to localities (community, country, world), disposition to volunteer and participate in civic activities, readiness to respect the values and privacy of others, acceptance of human rights and equality, appreciation and understanding of differences between value systems of different religious or ethnic groups 	<ul style="list-style-type: none"> Issues with traditional assessments: <ul style="list-style-type: none"> Focus on pre-specified knowledge and concepts Prove difficult to capture all knowledge Designed to yield only one correct response Advantages of ICT-based assessment <ul style="list-style-type: none"> Supports educational innovation and development of 21st century skills Collaboration Gives a more nuanced understanding of what students know and can do Recommendations for new, transformative assessments <ul style="list-style-type: none"> Need to capture the wider range of knowledge that students are acquiring by carrying out new kinds of activities with the use of ICT Should be able to account for divergent responses, while measuring student performance in such a way that reliability of measure is ensured Should reveal the kinds of conceptual strategies that a student uses to solve a problem (i.e. considering responses, but also interpreting their behaviors that lead to a response). Can use computers to log keystrokes and assess behavioral data High quality assessments of 21st century skills are currently available in Europe: <ul style="list-style-type: none"> ICT: World Class Tests, VQA Project, eVQA, Cascade, International Society for Technology in Education Citizenship: International Civic and Citizenship Education Study 	Click here for link to paper
Ireneke Bulo, Cambridge Assessment	2013	21st Century Skills: Ancient, ubiquitous, enigmatic?	UK	<ul style="list-style-type: none"> Determine approaches to developing 21st century skills Identify advantages and disadvantages of assessing 21st century skills 	NA	<ul style="list-style-type: none"> Advantages of Assessing 21st Century skills: <ul style="list-style-type: none"> Improve literacy/oracy of learning, sustaining employment by quantifying skills needed Focus of assessing based on the investigative process vs. the final output Drawbacks of assessing 21st Century skills: <ul style="list-style-type: none"> Discourage risk taking by students who care more about grade than content of assignment Some skills are too subjective and enigmatic to be measured objectively (i.e. creativity involves all 5 senses, infinite or collaborative and initiative taking as highly contextual and difficult to quantify) 	www.cambridgeassessment.org.uk/Images/130437-21st-century-skills-ancient-ubiquitous-enigmatic-.pdf

Review of Assessments on 21st Century Skills

Author	Year	Article Title	Country	Objectives	Indicators & Measures (e.g. examples of questions, useful indicators)	Findings	Notes	Link
ETS	Early 2000s - Present	ETS ISkills	US	<ul style="list-style-type: none"> Objective of Skills is to assess information and computer technology literacy ICT literacy distilled into 7 skills: define, access, evaluate, manage, integrate, create, and communicate 	<ul style="list-style-type: none"> Focuses on measurements related to the 7 skills listed in "Objectives" column Define: Ability to formulate a research topic Access: Ability to collect information in digital environments (e.g. putting files into folders) Manage: Ability to apply an existing organizational scheme for digital information (e.g. putting files into folders) Integrate: Ability to compare and contrast information from different sources Evaluate: Ability to determine degree to which digital information satisfies the needs of a given task Create: Ability to generate information by adapting, applying, designing, or inventing information in ICT environments (i.e. creating graphics) Communicate: Disseminate information tailored to a particular audience in an effective digital format Uses real-time, scenario-based tasks Tasks mirror the way individuals use information in business and personal contexts Test content is balanced among different subject areas (humanities, pop culture, science) Uses interactive tasks based on real-world scenarios ISkills is used to gauge ICT literacy when students enter university and again after some period of time (i.e. after taking a research class, or at the time of graduation) to measure improvement Software simulates different tasks that students would do on a computer Students are graded based on their response to the real-world scenario Each scenario has a "best answer" and subsequently "less good" answers An example would be a screen that shows a list of emails with a dialogue box indicating who the email is from and the purpose of the email. Students are asked to organize the emails into different folders. 	<ul style="list-style-type: none"> Students, professors, and librarians have found that that the assessment is an accurate representation of the skills needed for success in both academic and professional settings 	NA	https://www.ets.org/skills/about
Partnership for 21st Century Skills	2007	21st Century Skills Assessment	US	<ul style="list-style-type: none"> Objective is to propose different ways of assessing 21st century skills Need to move away from measuring discrete knowledge to measuring students' ability to think critically, examine problems, and make informed, reasoned decisions while using technology Current tests do not gauge how well students apply their knowledge 	<ul style="list-style-type: none"> Two approaches to assessing 21st Century Skills, ideally used in conjunction with one another: <ul style="list-style-type: none"> Summative assessments 21st century skills should: <ul style="list-style-type: none"> Have the goal of assessing whether the learning that was intended actually happened Tied to previously established learning Use short and concise questions free of ambiguity to ensure validity Be reliable and provide unbiased results Provide a fair assessment that does not favor families of different income statuses Be administered widely so as to inform teachers and administrators whether learning is taking place Formative assessments of 21st century skills should: <ul style="list-style-type: none"> Make students' learning and understanding readily apparent so that educators can determine their students' current knowledge, understandings, thinking processes, and misconceptions Measure or observe a student's mastery of skills along several axes with an established rubric Be structured so that educators can identify the background knowledge a student used to solve each problem in real-life Be performance-based Generate data that can inform instructional practices Build capacity for both teachers and students (i.e. should show where further learning and teaching is needed) Be part of a comprehensive continuum Reflect an understanding of learning as multidimensional, integrated, and revealed in performance over time 	NA	<ul style="list-style-type: none"> Strong link between teaching curriculum and assessment Need to align both types of assessments with curriculum Need to create standards and rubrics Assessment tools should be iterative Assessment models need to be evaluated and updated There is a need for constant updating and adjusting 	Click here for link to paper
Robert Kozma	2009	Transforming Education: Assessing and Teaching 21st Century Skills	US/Europe	<ul style="list-style-type: none"> Kozma assesses the current state of 21st century skills assessment and proposes a plan to improve it Multiple objectives to the 21st century skills project discusses in his paper: <ul style="list-style-type: none"> Promote and support the development of ICT-based assessments for the full range of 21st century skills within the context of school subjects and real world problems Work with stakeholders to specify 21st century skills in measurable ways that are relevant to real world work and everyday situations Examine classroom innovations and find ways to take ICT-based learning environments and assessments out of the laboratories to scale Encourage and support the development of national and international assessments that incorporate the use of ICT Specify range of preconditions required of schools to use ICT-enabled assessments Identify, elaborate on, and address the barriers to ICT-based assessment of 21st century skills 	NA	<ul style="list-style-type: none"> Different definitions of 21st century skills, but common skills are: creativity, critical thinking, problem solving, communication, collaboration, information fluency, and technological fluency Operationalizing these skills, and defining them precisely and in measurable terms is still ongoing and will be difficult, more challenging for skills like innovation, critical thinking, and collaboration No large-scale implementations of ICT-based assessments of the 21st century skills other than ICT literacy and problem solving Assessments need to be changed to address the realities of a modern workplace; traditional assessments do not measure all of the competencies and skills that are needed in the 21st century workplace and society Incorporation of ICT into large-scale assessments has a number of advantages: <ul style="list-style-type: none"> Reduced costs of data entry and collection Ability to adapt tests to individual students Ability to collect and efficiently score responses Ability to collect data on students' indicators of thought processes and intermediate products There are also drawbacks to using ICTs for large-scale assessments: <ul style="list-style-type: none"> High start-up costs Need to choose between native and standardized apps Connectivity issues 	<ul style="list-style-type: none"> This article has encouraging findings given the launch of the ASER app 	Click here for link to paper

