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## KEY MESSAGES



- Guyana is the only English-speaking South American country with a population of 750,000.
- Information Technology is taught in most secondary schools using a national syllabus, and then can be taken as an elective, including problem solving, algorithms and programming, hardware devices, as well as the use of applications software. Computer Science can be taken at advanced level.
- We carried out a small-scale mixed-methods study with 48 teachers in two areas of Guyana, which accompanied a workshop covering a range of interactive activities.
- Data from teachers included free text writing about their experiences, a short survey, and focus group notes. Teachers reported that they found programming hard to learn and teach, and hardware devices easy to learn and teach.
- Teachers reported a keen interest in the teaching of Information Technology and a desire to improve the opportunities for their students but they described a range of challenges including: lack of computers; lack of subject knowledge; and lack of support.

## Guyana – key facts

Capital: Georgetown  
 Official language: English  
 Currency: Guyanese dollar  
 Population: 777,000  
 Famous for waterfalls and gold mines!  
 70% of Guyana uninhabited. ...



## FINDINGS

Teachers were asked what topics they found easy or hard to teach and which students found easy or difficult to teach. The free-text task elicited a range a range of topics across information technology and computer science. The majority of teachers reported that programming was hard to teach and hard to learn, whereas the teaching and learning of computer architecture was thought to be easy (see Table 1).

Topics	Easy to teach	Easy to learn	Hard to teach	Hard to learn	Total refs
Computer architecture	20	12	1	0	33
Programming	2	0	15	10	27
Software applications	10	4	3	3	20
Spreadsheets	3	1	7	2	13
Binary numbers	2	1	6	2	11
Input and output devices	7	3	0	0	10
Databases	0	0	6	3	9
Word processing	5	3	0	0	8
Information processing	2	0	2	0	4
Problem solving	0	0	1	2	3
Networking	1	1	1	0	3
Pseudocode and flowcharts	1	0	1	0	2
Computers in society	2	0	0	0	2
File Management	0	0	1	1	2
Ethics	0	0	1	0	1
Presentation software	0	0	1	0	1

Table 1: Summary of responses from teachers to the first task

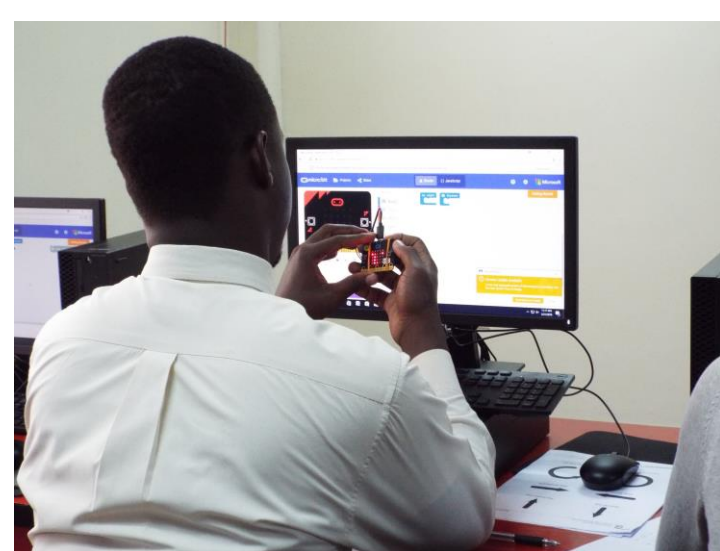
In a questionnaire, 94% teachers said they would like to improve their subject knowledge in IT and Computing. 63% said they would like more support in teaching the topics in the curriculum and 58% said that students are not always engaged in the subject matter. Only 15% said that they lacked confidence in what they were teaching (see Table 2).

Statement	% teachers
I would like to improve my subject knowledge in IT and Computing	94%
I would like some more support in teaching the topics in the curriculum	63%
Students are not always engaged in the subject matter	58%
I enjoy teaching the topics in the curriculum	42%
Students are very engaged in the way that I teach and the subject matter	25%
I would like to teach different topics than those in the curriculum	23%
I don't have a lot of confidence in teaching the topics in the curriculum	15%

Table 2: Statements agreed with (choose maximum of 3)

## THE STUDY

- In March 2018 we designed an intervention for teachers of IT and Computing in two areas of Guyana: Berbice and Georgetown. The intervention took the form of an all-day workshop for teachers of ICT and Computing in the area.
- 47 teachers participated in the workshop, although we only have a full set of data from 42 teachers. Teachers in the study all taught Information Technology and ranged from trainee teachers to those with more than 20 years' experience. Teachers had a range of experience and taught on the following courses: Information Technology, Computer Science, Electronic Document Preparation and Management, Mathematics.
- The session that the teachers participated in included a session on unplugged approaches to learning computer science concepts, physical computing with the micro:bit, and approaches to programming pedagogy.



The workshop included both cup robotics algorithmic-thinking activities and physical computing

## FINDINGS (CONTD)

Facilitators made written notes noting key points raised by teachers in the focus groups. These were coded by the researchers and summarised under themes. Through focus groups, teachers articulated a need for teacher training, support and more resources to support teaching and to engage students.

Teachers' confidence was not as much of an issue as expected. However, where confidence **was** described as an issue it was around programming. See Table 3 for key themes emerging and their frequencies.

Help needed (theme)	Num
Curriculum	7
Resources	6
Pedagogy	6
Teacher training	6
Support	5
Knowledge	5
Students	5
Motivation	5
Enjoyments	4
Class activities	4
Confidence	3
Qualifications	3
Workshops	2

Table 3: What teachers are looking for (from focus groups)

*"I enjoy teaching about the contents of the curriculum since a lot of concepts are involved in the practical aspect. It brings out students involvement on the content also ... though I am excited to teach the topics as a teacher I am very disappointed in the lack of resource that public schools are given. This also motivates me to try different approaches in order to overcome the lack of resources" (Teacher 13).*

## DATA COLLECTION

The study was designed around a workshop, with data collected before and after the workshop. Three separate instruments/ approaches were used:

1. An initial writing task about experience of teaching
2. A post-workshop exercise on challenges and opportunities in teaching IT and related subjects
3. A set of focus groups with workshop facilitators to allow exploration of the topics raised in the second exercise

The initial task was sufficiently open for teachers to be able to describe their experience. They were also asked about their experience of the curriculum and what they found easy/hard to learn and easy/hard to teach.

After the workshop, teachers were asked to reflect by selecting three statements from a set of 7 provided and using these to reflect on the challenges and opportunities of being a computing teacher.

We held small focus groups where the choices made in the second task were explored with the facilitators. The intention of all activities was to be useful as reflection for the teachers. In addition to providing data for analysis. Ethical guidelines from King's College London were adhered to and appropriate permissions were obtained from all participants.



## WHAT'S NEXT?

Since these two workshops, two additional workshops specifically focusing on Python programming and methods of teaching programming were conducted in January 2019 with the same group of teachers from Berbice.



Teacher working with a micro:bit

These workshops were facilitated by the second and third authors and supported by the Regional Education Office for Berbice. These workshops introduced teachers to the Python programming language and to pedagogical approaches to teaching programming. Programming in Python was requested by the teachers as they are now preparing to deliver the new CSEC IT syllabus which will allow them to teach Python as well as Pascal.

## CONCLUSIONS

There is now a need to educate young people in a range of skills that will help them to participate in and drive forward an increasingly technology-driven world. This brings with it many challenges, which are particularly apparent in countries that are classified as having developing economies.

This poster describes the first study relating to computing education in Guyana. We found that professional development opportunities and resources for the teaching of computing are emerging more slowly in Guyana than in other countries reported on in the literature. From our conversations with teachers in Guyana, we suggest that we need to hear the voices of teachers all around the world. We conclude that more research is needed to establish the best use of resources to support computing as a truly global subject.