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CT and the Readiness of the Education in Jakarta to Face VUCA Due to the Covid-19 Pandemic.

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Abstract. Jakarta as the capital city is viewed as the barometer of every city in Indonesia. The city preparedness to face VUCA (Volatility, Uncertainty, Complexity and Ambiguity) caused by Covid-19 pandemic is also in the national spotlight. One of the main solutions to face VUCA is Computational Thinking (CT). CT provides the ability to approach VUCA characteristics by systematically ingraining abstraction, algorithmic thinking, decomposition, and pattern recognition in mind. For this reason, Jakarta plans to disseminate this concept to students as early as possible, namely by embedding CT to every subject in primary and secondary schools. The activity began with online CT socialization, which was attended by 1,761 teachers, of which 238 via Google Meet and 1,523 via live streaming. In this activity we also distributed questionnaires to 258 elementary and junior high school teachers spread across 41 sub-districts of 44 sub-districts in Jakarta. The result is that 93.8% of teachers in Jakarta do not understand CT, excitingly 69.4% of teachers wish to teach CT in the subjects they can afford even though it is not compulsory, but if it is obligatory then all teachers will implement it.

1. Introduction

At the end of September 2020, Jakarta, the capital city of Indonesia is the epicenter and the province with the most Covid-19 confirmed cases[1] has entered into the second wave of large-scale social restrictions (similar to lockdown), because the abolition of previously large-scale social restrictions proved to increase the number of cases[2].Large-scale social restrictions rule is a gubernatorial policy aimed at limiting the movement of people to reduce the spreading of Covid-19.Althoughthis situation proved effective in controlling the spread of the pandemic in Jakarta[3], the consequencesimmediately felt waslarge economic losses and severe disruption for allstages of life due to large scale restrictions in Jakarta[4, 5].The turbulent, chaotic, and rapidly shifting environments in which we live have developed the 'new normal'.

It seems that the society is facing volatility, uncertainty, complexity, and ambiguity (VUCA).Volatility can be defined as a rapid, frequentand significant change for which the duration may be unidentified.Uncertainty means that the elementary cause of an incident is not known. Complexityis a situation that have many interrelated parts and variables.A complex problem is when multiple models that do not fit well with each other – that is what makes individuals think they are

facing a complex situation[6]. Ambiguity refers to ambiguous situations, where causal relationships are unclear and precedents do not exist.

In the recent decades, VUCA created by the unending developments allowed by information technology. It is also triggering of the third revolutionary industry and Industry 4.0.Just as the first industrial revolution that was driven by the steam powered machinery. The powered machinery also created VUCA in nineteenth century. To adapt with VUCA, organizations have to transform from knowledge-intensive to a research-intensive[7], and knowledge workers necessity to be armed with skills to continuously sense the environment for change.Today'sorganizations environment are based on the ideas of digitalization increasing the social demand for workers who are ready to process large volumes of information, multi-dimensional investigation of data, and finding intelligent management solutions rapidly while meeting the condition of uncertainty and risk[8]. This is critical for success to shape personal resilience, provide the best possible attention in a different ecosystem, innovate for better systems and advocate for more vulnerable communities.Many organizations of course choose to recruit knowledge workers from university graduates who already have the ability to do this.

But there is a disparity between the output of higher educations and the expectations of organizations[9].In higher educations,VUCA is not yet the norm in academic thinking[9].To further strengthen the point,policy papers from OECD and UNESCO have been emphasizing the need to prepare students for a VUCA world[10].VUCA should be adopted in academic thinking, because the VUCA forces will present organizations with the necessity to move from linear modes of thought to problem solving with artificial and simultaneous thinking [11].VUCA also provide for the emergence of critical incidents and events that are not readily anticipated[12]. Hence, making students to be not only conversant in their disciplines, but also can work in fast changing digital atmospheres should be one thing higher education does particularly well.

It would be great if adaptation to VUCA was taught as early as possible. This is what the government of Jakarta preparing of. They will infuseCTin education since elementary school.CT was chosen becauseVUCA created by the unending developments allowed by information technology as mentioned above, and VUCA caused by Covid-19 pandemic is an outlier. It is like a Black Swans theory [13]. The term Black Swans states to random events that have a very less chance of happening, but, yet cause maximum harm when they hit [13]. Even though it is an outlier, but it has opened the eyes of the government to adapt with VUCA by infusing CT to education.

The Education Office of Jakarta have chosen 359 teachers to be trained as trainer in CT. They will be trained by lecturers that came from 14 universities. The teachers will disseminate their knowledge to their colleagues. The total target of teachers to be involved in this movement are 4,320 elementary and secondary teachers.

The problem is the readiness of the teachers who will disseminate it to pupils. To find out the readiness of the teachers in teachingCT, we conduct this research. The subjects of this research are elementary and secondary school teachers from all sub-districts in all Jakarta cities. Jakarta is a province with five cities and one district.

2. Methods
The readiness of teachers was approached with a quantitative research method. The primary data was collected using survey. The survey was conducted in August 2020 by using an online tool named Google Forms.

2.1. Aim
The aim of this research is to find out the readiness of elementary and secondary school teachers in Jakarta to teach CT.

2.2. Participants

The participants or sample of this research was chosen by convenience sampling done by the Education Office of Jakarta.The total number of targeted participants of this research were359elementary and secondary school teachers from all 42 sub-districts in Jakarta cities, but only 258 responded.With thepopulation of 38,986 and confidence level 95%, we find out that the margin of error of the sample to be generalized is 6%.

2.3. Data Collection

This research uses primary data only. The data collected by online survey using Google Forms. Most of the questions are close ended so it can quantify.

2.4. Data Analysis

We use part-to-whole data analysis, a categorical portion are measured as a ratio to the whole (i.e., a fraction out of 100%). A pie chart or bar chart is used to visualize the data.

3. Findings

After analysing the collected data, we found some findings. Some of the findings will be visualized in pie or bar charts to make the reader more quickly in perceived the information.

3.1. The motivation

The most of the participant's motivation to be part of the movement is to improved their knowledge about CT (86.4%). Some other motivations are to widen their network (25.6%) and because that this is one of the flagships of the Minister of Education of Republic of Indonesia (27.9%). In other question in the survey, only 30.6% of the teachers answered that they will be part of this activity/movement because obliged and 69.4% will active in the movement of his own accord, see **Figure 1**.
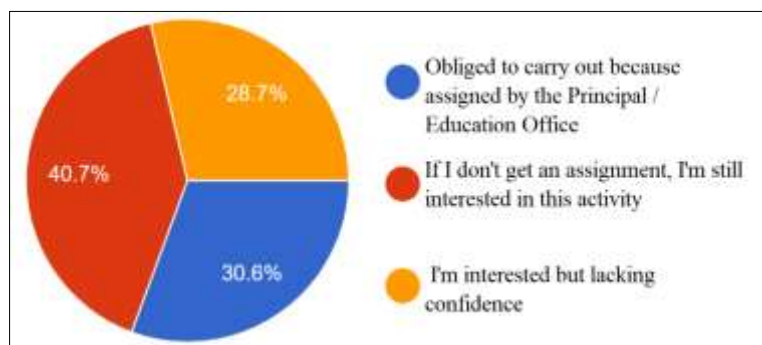

Figure 1. The motivations of the teachers.

3.2. Principal's support

Some (8.1%) of teachers that was chosen to be trainer not informed it to their school's principal. It makes not all of the participants got support from their school principal. Some school principals do not support their teachers yet to be trainer in CT because they do not know the movement exactly. But most of school principal (84.9%) support their teacher to be involved in the movement, see **Figure 2**.

Figure 2. Teachers supported by their school principal.

3.3. Background knowledge

Background knowledge of the participants related to CT is low, only 36% participants know "the definition" of CT, see **Figure 3**. Teachers who already know about CT from training is just 6.2%, 29.5% of the participants do not know it at all, see **Figure 4**.
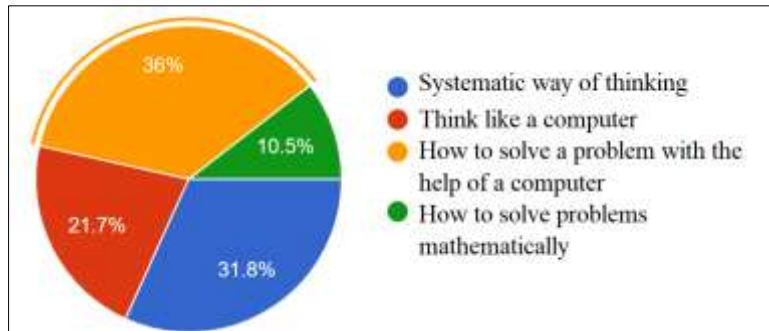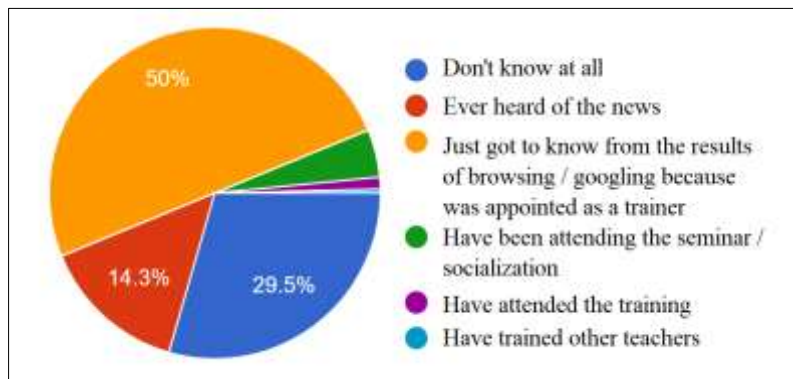
Figure 3. The "definition" of CT.

Figure 4. Knowledge about CT.

3.4. Objectives

The objectives of teaching CT in the perception of teachers can be seen on **Figure 5**. It is good that only 2 or 0.8% of teachers have chosen "So that students can make computer programs", because CT is not intended to teach computer programming.
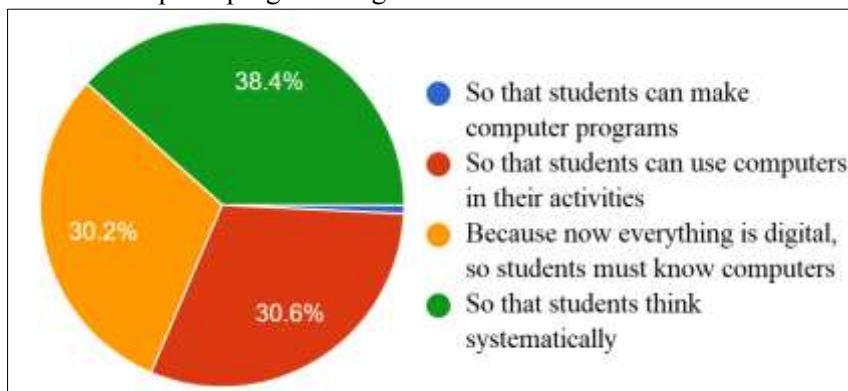
Figure 5. The objective of learning CT.

4. Summary

The movement to disseminate CT by government of Jakarta are massive that involving 4,320 of 38,986 elementary and secondary school teachers in Jakarta. Our findings show that even though the participants background knowledge about CT are low but their enthusiasm is high and most of school principal are supporting the movement. So, we see that elementary and secondary school teachers in Jakarta are ready to teach CT to face VUCA. This statement can be generalized to the whole province of Jakarta with confidence level 95% and margin of error 6%.

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