Problems:

The first potential issue is the **small screen/layout on the smartwatch** which causes the screen to be overwhelmed with the contents (i.e buttons, image, text, etc). Our target user is 5-8 years old kids which can be considered as novice users who are not familiar with the system as they are still developing their mental model. In most of the cases, the cluttered and complex layout on the smartwatch screen could lead to the kid's difficulty in choosing the right functionality (i.e button) in order to achieve their goal efficiency and effectively (i.e make phone calls and pick up phone calls). The kids, especially 5-6 years old, cannot focus their attention on the things that are relevant to what they are doing.

The second issue is the **noisy school environment** such as kids playing around at the class, chatting at the school canteen, etc. Thus, they will be easily distracted from surroundings and not be aware of the incoming calls from their parents thus miss the call.

Solutions:

To solve the first potential issue, we can avoid the complex functionality which limits the number of buttons on the screen. For example, we can apply the Fitts Law principle which only places one or two important buttons such as calling and texting options to avoid confusion. We can also customize the button to their parent's photo and related images to indicate the functionality which can promote recognition better than recall as humans are good at remembering visual cues compared to text. This is due to when the kids see their parent's photo or image, they will automatically know what to do next if they want to make a phone call as well as pick up the call. Hence, this solution will also improve the visibility of the smartwatch's function.

To solve the second potential issue, we can make use of blinking/flashing color along with vibration to better capture user attention. We could use some monochromatic color scheme to tell users about the incoming calls so that it could grab their attention. Moreover, we can let the user customize the auto phone pick up time (i.e 1, 1.5, 2 minutes). For example, if there are incoming calls and the user isn't aware of it, the call will be automatically picked up after 1.5 minutes.
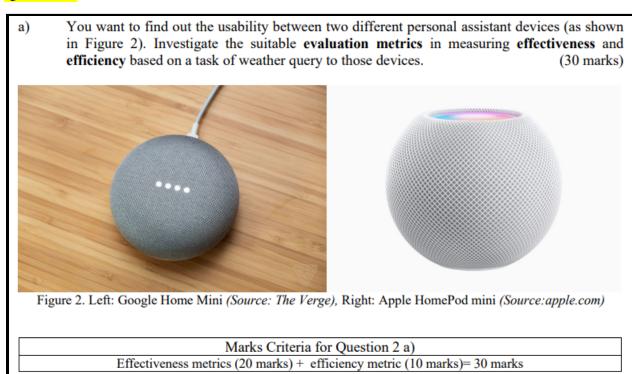
b) *Remember to add HTA if occur in FOA*
- The purpose of the HTA analysis is to understand the way users perform their current job with the existing system either in a computerized or manual system.
- By understanding how users perform the tasks, the system can be developed which matches with the user's mental model so that it is compatible with what the user already does thus reducing learning time.
- For an illustration, we can do a HTA analysis on important tasks such as making a phone call and picking up a phone call from somebody.
- By doing this, we can obtain extensive and detailed information about task activities (i.e make phone call and pick up call) which can be used for further analysis so that they can design the smartwatch which can reduce the number of steps in carrying out these tasks to enable the target user, kids to complete their task more efficiently and effectively.

HTA

0. Pick up phone call

1. Look at the smartwatch's screen
2. See what people call you
3. Tap the "Answer" button
4. Answer incoming call
5. End current call

a) You want to find out the usability between two different personal assistant devices (as shown in Figure 2). Investigate the suitable **evaluation metrics** in measuring **effectiveness** and **efficiency** based on a task of weather query to those devices. (30 marks)

Figure 2. Left: Google Home Mini *(Source: The Verge)*, Right: Apple HomePod mini *(Source:apple.com)*

Marks Criteria for Question 2 a)
Effectiveness metrics (20 marks) + efficiency metric (10 marks)= 30 marks

These 2 personal assistant devices will be distributed to the 20 randomly selected users to perform the task of weather query (i.e ask for weather information).

Effectiveness is the completeness and accuracy with which users achieve their goal. In order to calculate the **arrucancy**, we can measure the percentage of users getting the weather either current or forecast weather from those 2 personal assistant devices versus real, correct weather information (%) to know if they are getting the correct weather information. Next, the measurement of the **completeness** can be calculated by assigning "1" if the participants manage

to perform the task which asks for weather information through the personal assistant devices successfully and "0" if he/she does not. The calculation of the **effectiveness** of those 2 different personal assistant devices which are Google Home Mini and Apple Homepod Mini can be measured by the number of tasks completed successfully by the participants (asks for weather information) divided by the total task performed by the participants then multiplied with 100 percent to know the percentage of the effectiveness. Last, we can do a comparison with their effectiveness percentage to find out which devices are more effective.

Efficiency can be defined as the time and efforts in which users need to put in in order to achieve the goal. As an illustration, we can use stopwatch to observe and record the task time which is the time taken by the participants to complete the task (ask for weather information) either in seconds or minutes with 2 different personal assistant devices which are Google Home Mini and Apple Homepod Mini. After that, we can do a task time comparison to know which personal assistant devices take shorter time. In conclusion, the one which take shorter time will be considered more efficient.

b) Between *Laboratory study* and *Field study,* which is the most suitable for your evaluation in the scenario given in Question 2 a)? Justify your answer. (10 marks)

c) IT programmers are encouraged to work from home during Covid-19 pandemic. Demonstrate with **TWO (2)** important factors on how they could make the working environment ergonomically correct. (10 marks)

b) In my opinion, I think that laboratory study is more suitable for the evaluation between these 2 personal assistant devices. This is because by conducting laboratory study, we can manipulate the factors such as environment noise, wifi performance, lighting, etc to determine if such manipulation generates a change in the usability measurement result for these 2 personal assistant devices. Besides, laboratory study allows us to select the suitable participants and place them in a condition which is more systematic. For field study, although it's advantage is the evaluation results can be more towards the real life context because it represents a variety of situations and environments that subjects experience in their natural habits, it might cause the problem of lack of control which makes it difficult to judge the generalizability of the evaluation.

Hence, laboratory study can provide a more controlled environment for the tester to find out more precise and accurate evaluation results of these 2 personal assistant devices which can be used for further improvement on their UI design.

c)

The **equipment** such as tables and chairs selected by the IT programmer are one of the important factors to make the working environment become ergonomic. To illustrate, the seat should be padded for comfort but maintain a good posture to avoid repetitive strain injury (RSI) such as back and shoulder pain. Next, there should be enough space under the tables so that their legs can fit comfortably under the desk when sitting. The edge of the tables should be smooth and rounded to avoid getting unnecessary injury.

Next, **the quality of lighting** can affect programmer mood and well being. Note that poor lighting can cause eye strain, stress and fatigue. Therefore, adequate lighting should be provided such as natural light to improve mood and aid concentration on their work. Another thing to consider is the position of the light sources. We need to make sure that light sources don't cause glare on the monitor screen . The programmer should not sit back to a window or face the window as this will make reading a monitor difficult.