Develop applications based on android: Teacher Engagement Control of Health (TECH)

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Abstract. Physical and psychological condition of teachers is very important because it had helped determine the realization of a positive school climate and productive so that they can run their profession optimally. This research is an advanced research on the design of ITEI application that able to see the profile of teacher's engagement in Indonesia and to optimize the condition is needed an application that can detect the health of teachers both physically and psychologically. The research method used is the neuroresearch method combined with the development of IT system design for TECH which includes server design, database and android TECH application display. The study yielded 1) mental health benchmarks, 2) physical health benchmarks, and 3) the design of Android Application for Teacher Engagement Control of Health (TECH).

1. Introduction
Teacher excellence is not merely an example of the knowledge, attitude and actions, but also exemplary in terms of keeping yourself both physically and psychologically. The idea that a healthy teacher will produce a healthy and successful student has emerged for a long time. Because teachers who are interested in taking care of their health will also tend to pay attention to the health of their students and become role models in generating healthy behaviours [1]. In addition to the physical, teachers must also be able to maintain the condition of psychic to stay healthy, because the psychological health of teachers is closely related to the source of stressors that affect their profession. This condition contributes negatively to the psychological climate in school [2].

School climate can be created positively and productively when teachers are able to run their profession optimally. Conditions in which teachers interpret and run the profession is called the teacher engagement. The teacher who is engage is a teacher who in his existence is always professional because of his ability to keep himself physically and psychologically [3]. Behavioural and emotional engagement proved to be an indicator of the internal dynamics of students’ conditions that contributed to the success and success of students in schools because teachers who engage will experience a high level of connectivity with their job duties. Teachers will strive to achieve task-related goals with definitions and roles that lead to high performance achievement [4], [5]. Therefore, there is an effort to build the condition of teachers to engage with their profession by maintaining...
health condition both physically and psychologically, especially in Indonesia as a country having various demography condition.

This effort has been carried out throughout 2015 - 2017 by building an instrument of teacher engagement in accordance with the Indonesian context called the Indonesian Teacher Engagement Index (ITEI). ITEI is an instrument used to detect the condition of teachers' engagement in Indonesia. However, seeing the importance of physical and psychological health roles for teachers in carrying out their profession, ITEI needs to be equipped with instruments capable of detecting these conditions. ITEI as early detection has been realized in android application, for it required a familiar self-control in the daily activities of teachers through their gadgets.

According to statistics 'we are social' most of global users utilize in smartphone than personal computers, and it has been increased 5% in January 2016. Indonesia itself in January 2017 smartphone users dominated by Android reached 71.6% [6]. Regarding to this data and problems that have been explained before, this research proposed to develop an android application to control ITEI's teacher health. By this research, the teachers will be able to handle their concepts.

The basic concept of self-control centres on the hearts of each teacher that is related to the wellbeing problem. The more teachers can keep the heart, the joy will be able to improve the overall health of teachers [7]. No health is realized without mental health. Mental disorders will have an impact on physical disorders that will ultimately affect the quality of the work [8]. Although the teacher is professional, but if his ability is weak in controlling both physical and psychological, it will result in the teacher personally become not engage. To maximize the engagement of teachers in Indonesia required an intervention medium that served as an electronic supplement that can control themselves through android based applications. The application is then called Indonesian teacher engagement which is then named TEACHER ENGAGEMENT CONTROL OF HEALTH (TECH). The formulation of the problem is how the TECH application system?.

Media intervention is a new breakthrough for teachers in Indonesia as a complement of the approach of the Ministry of Education and Culture of the Republic of Indonesia is to assess the performance and competence of each teacher periodically. And the two assessments are not measuring what should be measured. Through this TECH, then the teacher will have the ability to assess himself, improve himself and progress because of himself. And this all in the end become a benchmark in the form of Electronic Master Teacher Engagement Indonesia.

2. Research Methods
The combination of qualitative, quantitative research summarized in the neuroresearch method became the main basis of this study. This method is also combined with the development of IT system design for TECH which includes server design, database and android TECH application display. The neuroresearch method is performed through three main stages: exploratory, explanatory and confirmatory stages with the result of theoretical basic concepts and instruments used in the application [9] - [11]. Neuroresearch methods are also performed to find the positioning of applications between similar applications so that these applications have more comprehensive and appropriate benefits in detecting the condition of teachers.

3. Result
3.1. Measuring mental health
WHO explained that there is no healthy individual if it does not have a healthy mental [12]. Mental health is related to the condition of individuals who are psychologically positive. The positive concept of psychology is a general term that shadows the emotional condition of a person, the character is in a healthy psychological condition [13]. Someone is said to be in a healthy psychological condition when they feel wellbeing, have quality life and work and do not experience boredom and burnout conditions [14] - [16].

Subjective wellbeing has a diverse range of categories that include a variety of phenomena that can have a positive impact on one's health even the life span of a person [17]. Subjective wellbeing is more dominated by the psychological condition of the individual subjectively So is the quality of working life. As one of the concepts in positive psychology, quality of work life is a process that enables
individuals to participate actively and effectively in the work environment and organization so that the expression can describe the environmental and humanistic values associated with one's work experience [15]. Conversely, one's psychological health also needs to be viewed from a different perspective one of them is burnout and boredom of work. Burnout is associated with physical and psychological fatigue that affects health problems and productivity declines. Burnout needs to be seen because it is a metaphor that generally describes a person's mental state in a depressed condition [16].

3.2. Measuring physical health

| Table 1. Vital Sign By Age [18] |
|---------------------------------|
|                                |
| Pulse (per minutes) | Blood Pressure | Respirations (breaths per minute) |
|---------------------|----------------|-----------------------------------|
| Adult               | 60 to 100       | 90-140mmHg                        | 12 to 20 |
| Children (1 to 8 yrs) | 80 to 100       | 80-110mmHg                        | 15 to 30 |
| Infants (1 to 12 mth) | 100 to 120      | 70-95mmHg                         | 25 to 50 |
| Neonates (1 to 28 days) | 120 to 160      | >60mmHg                           | 40 to 60 |

3.3. Android Application for Teacher Engagement Control of Health

Teacher Engagement Control of Health (TECH) is one of the supporting menu in android ITEI. This will help teachers to control their health, by measuring the status of their vision, hearing, blood pressure, heart rate, lung capacity, respiratory rate, and oxygen. Android ITEI is a client-server application, as shown in Figure 1a, that implementing load balancer in server side to divide all incoming traffic to cloning server equally. By implementing load balancer will help to minimize the failure at server side [19], [20].

This research does not only measure the health status but also psychological status for subjective wellbeing, quality work life, burnout, and job boredom. Before developing the application, we conduct a research at google play store that compare the application TECH blue print to 3 of similar application about health and psychological measurement as shown in Table 2. iCare Health Monitor control the same health aspect in TECH, but not in psychological aspects. iCare Heart rate only control heart rate in health aspect, and iCare in respiration rate. Both applications do not control psychological aspects.

| Table 2. Comparison of Similar Applications |
|---------------------------------------------|
|                                |
| iCare Monitor | iCare Denyut | iCare Laju | Pernafasan | TECH |
| Kesehatan | Jantung | |
| Psychological - Subjective well being | √ | | | |
| Psychological - Quality work life | √ | | | |
| Psychological - | | | | |
Teachers are required to login first before using the TECH, and filling the biodata form. Login uses google account data. This data is used as identity of the teacher. Biodata and identity record in database, to make sure that we can still use this data in future. TECH application process teachers’ health status while they input data by using camera and screen smartphone. The process doing by mapping the user input into data in Table 1 and view the result ad the teacher’s health profiling as shown in Figure 2b.

Android TECH application is an application designed with the main purpose to improve the psychological condition of patients positively. Psychological conditions are first measured by answering many questions, and using measurements translated into specific algorithms will display results as well as related things to do. The main page display of Android TECH app is shown in Figure 2a, for the initial design there are eight main menus namely ITEI, Vision, Blood Pressure, Heart Rate, Insulin Schedule, Medicine Schedule, Visit Doctor Scheduler, and History. ITEI is the main menu of this application that serves to measure the psychological condition. This psychological condition is measured by answering many questions where the initial design. Users will be asked to answer questions whose answers are in the range 1 - 4. The answers will be reprocessed to show what needs to be done to improve the psychological condition of the patient positively.

| Burnout               | Psychological - Job Boredom | √ |
|-----------------------|----------------------------|---|
| Health                | √                          | √ |
| Vision                | √                          | √ |
| Health                | √                          | √ |
| Hearing               | √                          | √ |
| Blood Pressure        | √                          | √ |
| Health                | √                          | √ |
| Heart Rate            | √                          | √ |
| Health                | √                          | √ |
| Lung Capacity         | √                          | √ |
| Health                | √                          | √ |
| Respiratory Rate      | √                          | √ |
| Health                | √                          | √ |

![Figure 1. (a) TECH Architecture; (b) 'Teacher Engagement Control of Health' Work Flow](image-url)
Support menu is no less important is Vision. This menu serves to assess the condition of the patient's eye now. Includes a myopia (minus eye) Figure 2b is performed by checking the introduction of a number of shapes from a certain distance, and colour blind Figure 2c is performed by digitally recognizing the identification of numbers in a multi-coloured form. This application is also supported by blood pressure measurements that can be done on the Blood Pressure menu, the user only need to press the palm of the thumb at the point specified on the screen, the blood pressure measurement will automatically be performed and display the results as shown in Figure 2d. Based on the results shown Figure 2e will be given appropriate recommendations.

![Images of menu interfaces](a) (b) (c) (d) (e) (f) (g) (h)

**Figure 2. Support Menu Interface**

TECH Android app also has a function to measure heart rate called Heart Rate. This measurement mechanism is the same as Blood Pressure, but the results shown are the number of heart rate and current health condition if you see the heart rate. Will also displayed recommendations in accordance with the results shown.

To support the health improvement of Android TECH applications also support the scheduling of drug consumption - Medicine Schedule and consultation time to doctor - Visit Doctor Schedule as depicted in Figure 2f-h. As well as one feature that is not less important is the History, this menu will record all the activities that have been done with applications ranging from assessment results have been obtained until the schedule of doctor's visit ever scheduled. Android TECH is also planned to manage features to provide dietary recommendations and exercises / activities that can be taken to improve the physical condition and psychology of patients.

4. **Discussion**

TECH android application is very important because the realization of teachers who engage with the profession is strongly influenced by physical and mental health. After TECH compared with existing applications, it turns out that existing applications have not been equipped with psychic test kea rah mental health measurement. Based on the comparison of existing applications, TECH proved to be more comprehensive and can be implemented to Indonesian teachers in self-assessment, developing itself based on expert system.
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