Chrysalyst, An Application for School Teachers to Identify Students with Mental Health Concerns

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Abstract: The current infrastructure in schools cannot keep up with the demand for personalized attention. Currently, most school counselors rely on teacher or parent referrals to identify and evaluate behavioral or psychological challenges in students. This is a post-facto approach rather than a pre-emptive one. This paper examines the use and framework of chrysalyst, which is a mobile application designed for schoolteachers to track the mental health of students on an ongoing basis and pre-emptively alert a counselor if any intervention may be required, thus increasing access to a support system for students in need. This paper is intended to serve as a proof of concept for the chrysalyst application, along with preliminary testing data collected in a live environment.

Keywords: Adolescents, mental health, pre-emptive identification, psychological challenge school counselor, students, social stigma, teachers.

1. Introduction

The cost to the global economy due to mental health conditions and their long-term impacts in adolescents and children aged 0-19 is an estimated US$ 387.2 billion (PPP) annually. [1] An estimated 13.5% of adolescents worldwide aged 10-14 and 14.7% of those aged 15-19 are living with a mental health disorder. [2] Suicide is the fifth most common cause of death for adolescents, claiming 45,800 lives yearly. [2] About one adolescent dies by suicide every 11 minutes—and this figure is almost certainly underreported due partly to the social stigma surrounding it and poor record keeping, especially in developing countries. 36% of young people (across 21 countries) say that they often feel anxious, worried, or nervous compared to 30% of older people. [3]

Mental health conditions are widespread and undertreated. Facilities to support those with mental health conditions are severely under-resourced. On average, countries spend only 2% of their health budgets on mental health. [2] The need of the hour is additional infrastructure to cater to the mental health needs of adolescents and enact measures to pre-emptively identify and prevent conditions from manifesting in more severe ways so that they can live to their full potential.

Presently, the number of psychologists or counselors specializing in treating children and adolescents is less than 1 per 1 million in all but high-income countries, where the figure rises to 55 per 1 million. [1] Contrast this with the adolescent suicide rate of 74 per 1 million, [2] and the countless others who struggle to deal with psychological conditions, and it is evident that the current infrastructure just cannot keep up with the demand for personalized attention.

Moreover, the social stigma surrounding actively seeking help further hinders the reach of support systems even when available. [4] Peer pressure, familial expectations, and conforming to societal standards of masculinity or femininity are some of the factors that prevent adolescents from seeking help. [1]

Thus, a system to identify adolescents at risk of facing mental health issues and refer them to a professional for help in making a diagnosis would be efficacious in reducing the burden on the overwhelmed support infrastructure. One way to implement this would be through schools—the places where adolescents spend a large proportion of their time.

To serve this purpose, I have developed chrysalyst—a mobile application designed to be used by class teachers in schools to track the mental health of their students on an ongoing basis and pre-emptively alert them if any intervention may be required. This paper examines the premise, intended use, framework, and methods of analysis used by chrysalyst, along with some data obtained from user testing in live environments by schoolteachers and counselors.

2. Application Construct

A. Premise of the Application

chrysalyst is a solution for schools to track the mental health of their students and provide timely and effective support catered to each student's individual needs. chrysalyst is developed for smartphones running Android version 9.0 or higher. The intended users are class teachers teaching grades 5 through 12 in schools across curricula and regions.

chrysalyst uses a data-driven evaluation system that analyzes information periodically filled in by a teacher on certain parameters pertaining to each student in the class. Based on the results from this data, it acts as an early warning system to identify behavioral or psychological challenges in students. The teacher can alert the school counselor as per the recommendations of the application, who can then use this data to tailor-make interventions for individuals as well as the class as a whole.

The application is intended for internal use in a classroom–

data is kept confidential between the teacher and school counselor.

Currently, in most schools, the counselor relies on teacher or parent referrals to identify and evaluate behavioral or psychological challenges. Most teachers wait for an event to occur to actually approach the counselor, by which time the most severe consequences would already be affecting the student in question. Being a pre-emptive identification system, chrysalyst aims to reduce the adverse outcomes for all stakeholders—by ensuring that the student receives the necessary support, and by extension preventing any disruptive event from occurring.

This app will be especially useful in the current post-pandemic scenario and help students who are returning to class after 2 years held virtually get back on track.
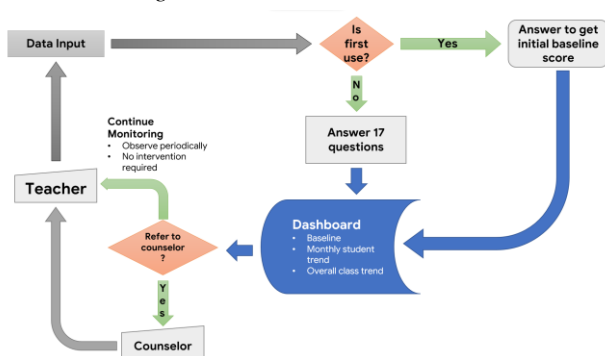
B. Intended Usage

Fig. 1. Usage flowchart

The teacher is expected to input a list of students in their class with a unique identifying number for each of them and answer 17 preset questions for each student to obtain a baseline score. Thereafter this assessment should be repeated on a monthly or quarterly basis. The teacher is provided with a dashboard with analytics for the most recent assessment results, as well as a trendline to track student performance on four category scores (see Section C: Framework). The dashboard also provides a recommendation for further observation or consultation with the school counselor based on the most recent result for a particular student.

In addition to the individual student analyses, the teacher can also view an overall class dashboard tracking three non-individualized parameters based on the average of the most recent response from each student. Based on the class average, the class dashboard also provides the teacher with a recommendation for further observation or group intervention for the class.

C. Framework

The 17 preset questions answered by the teacher assess pertinent factors contributing to four overall category scores for an individual student: Socially Inept, Aggressive and Destructive, Emotionally Disturbed, and Possible ADHD (Attention-Deficit/Hyperactivity disorder). A description of these is given below:

- *Socially Inept:* Questions under this category measure a student's level of confidence, cooperation with

peers, communication skills, and ability to cope in social situations.
- *Aggressive and Destructive:* This category measures a student's aggressive and destructive nature and compliance.
- *Emotionally Disturbed:* Questions under this category measure if a student shows signs of being disturbed—anxiety, depression, phobias etc.
- *Possible ADHD:* This category assesses if a student shows signs of hyperactivity or attention deficit.

These four categories were arrived at based on qualitative discussions held with school counselors. We determined that these four effectively encompass the mental health of an adolescent aged 10-18 given today's circumstances.

The chrysalyst student dashboard displays an average of the four score categories described above, along with trend data and a recommendation based on pre-decided trigger cut-offs.

The class dashboard displays an average of three score categories of all individuals in a class (Socially Inept, Aggressive and Destructive, and Emotionally Disturbed). The 'Potential ADHD' category was eschewed from the class dashboard as it is highly individualized, and it is not appropriate to base any decision or analysis on its average for a class. A high average for these three categories may indicate a larger systemic problem for the class, potentially requiring group intervention by the school counselor.

D. Analytical Methodology

The teacher must rate each parameter on a 5-point Likert scale: Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, and Strongly Disagree.

Based on the teacher's responses to the questions, the category scores for each student are calculated. Different questions have varying contributions to the category score, based on relative importance as determined by in-depth discussions with school psychologists. The category scores range from 1 to 5, with 1 being of least concern and 5 being of pressing importance.

The responses to the 17 questions are assigned integer values from 1 to 5, with 1 representing Strongly Disagree and 5 representing Strongly Agree. For certain questions, this scale was reversed to ensure consistency in ratings.

The questions are classified in four categories as previously mentioned. One question can appear in multiple categories with different contributions to each. The category contribution of each question is determined by multiplying the response value with a category-specific weight. The overall category score is calculated by adding up the contributions of all its respective questions and reducing it to a 1-to-5-point scale, with 1 being of least concern and 5 requiring the most attention from a teacher.

Scores of 4 or more require referral to the school counselor, those between 3-4 require further observation, while those below 3 do not require any intervention. This categorization is provided in the student dashboard, thus giving the teacher a handle on the next steps for each student.

3. Testing Data

The chrysalyst application was tested by 8 individuals, of which 2 were school counselors and 6 were teachers. A total of 52 students were evaluated by these testers. Profile of the testers is below.

Table 1
Tester profile

Teachers	Counselors
Teacher 1: Grade 6 to 10 in an ICSE school in Mumbai.	Counselor 1: In a private school in Goa.
Teacher 2: Grade 8 to 10 in an ICSE school in Mumbai.	Counselor 2: in private practice in Goa, was a school counselor earlier in Mumbai.
Teacher 3: Grade 6 to 8 in an international school in Mumbai.	
Teacher 4: Grade 7 to 9 in an international school in Goa.	
Teacher 5: Grade 8 to 10 in a state board government-aided school in Goa.	
Teacher 6: Special educator in an ICSE school in Mumbai.	

Fig. 2. Student distribution
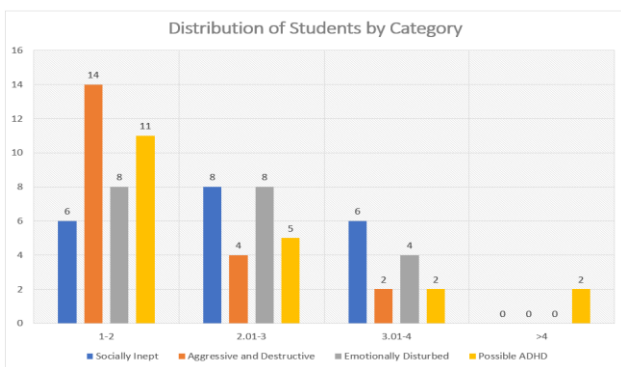
Fig. 3. Distribution of students by category

Note: Graph represents the number of students within each score band for each category.

Of the 8 testers, 7 testers self-selected their sample, while one was asked to rate her entire division of 20 students. To avoid any sample bias, data for the division of 20 students will be presented in this paper.

The proportion of students for whom chrysalyst recommended "refer to counselor" in the division studied is largely in-line with the WHO estimate of 13.5% - 14.7% of adolescents aged 10-19 living with a mental health disorder. [2]

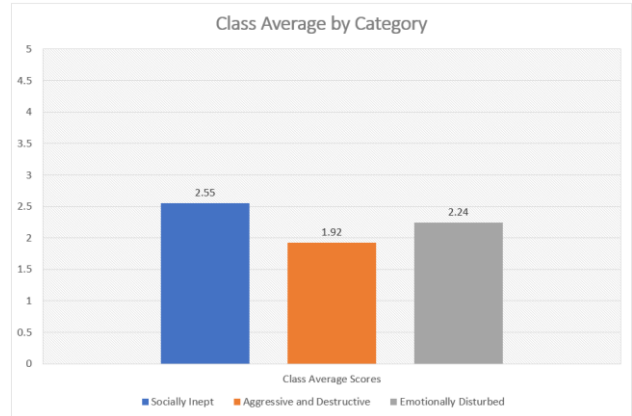The distribution of students across the four categories measured is depicted in figure 3.


Fig. 4. Class average by category

The above graph indicates that this class division does not require class intervention currently.

The testers also provided qualitative feedback on the application. Some verbatims are below:

- *"The parameters were really comprehensive, and I think the graph was nearly accurate, it wasn't tedious"*- Jamila, Teacher
- *"I like that it is to be done over a period of time so that an improvement or drop in the behavior can be graphically observed. It was really quick. Didn't take much time"*- Nashrah, Teacher
- *"The app is great as it gives a quick check to teachers regarding the child in different aspects like social emotional academics etc. The clarity provided as to what should be the next step for teacher is an amazing idea as it will give the teacher some clue regarding how to help the child."*- Noureen, Teacher
- *"This app is user friendly and is an easy to refer tracker for students' behavior. It has the potential to be a great tool for record keeping of students' behavioral data"*- Nandini, School Counselor

4. User Interface

Below are the images of the user interface from the application:
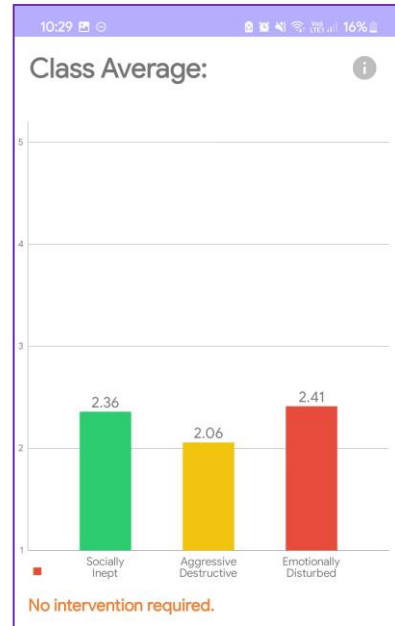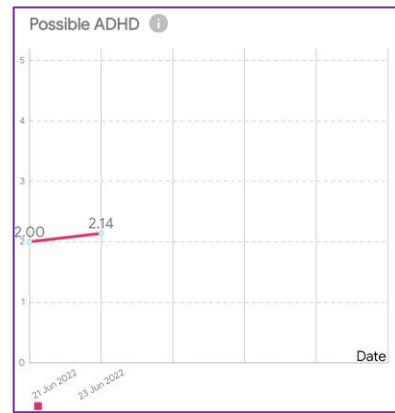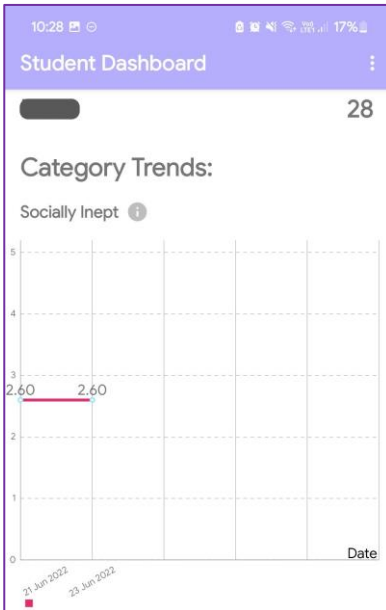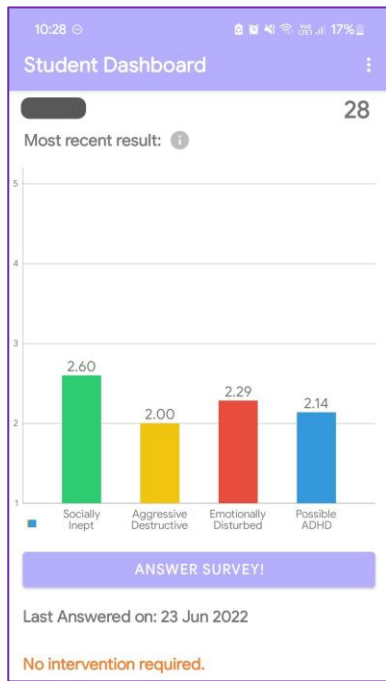
5. Conclusion

This paper serves as a proof of concept for chrysalyst, along with some first stage real-world testing. chrysalyst serves solely as an 'early-warning' tool meant to assist the identification and counselling process—it does not replace a professional diagnosis. Further validity testing will be conducted to establish the accuracy of the categories and questions outlined above.

When deployed in a classroom setting, in-depth teacher training is needed to familiarize teachers with the interface and parameters of the application. Along with this, the school will need to ensure periodic assessments for each student, and integrate this into the administrative process of teachers, much like filling in an attendance sheet or progress report. Doing so allows the system to operate at its full potential in pre-emptive identification.

The class aggregate data will provide insight to the school counselor and allow them to tailor make interventions across classes based on current needs and requirements of the school. Subsequent student evaluations can then measure the efficacy of individual or class interventions.

Visit chrysalyst.com for more information on this application.

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