A SAAS-Based Solution to Improve the Emotion and Attention of Left-Behind and Workers' Migrant Children

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Abstract. The mental health of left-behind and workers' migrant children is attracting social attention. Although teacher-giving mindfulness courses have been evidenced to improve school children's emotions and attention levels effectively, their implementation is facing challenges when teachers and funds lack is a common problem in the schools of left-behind and workers' migrant children. This study states a solution of applying for a saas-based mindfulness course as an alternative. After defining the requirements for running mindfulness courses in the schools of left-behind and workers' migrant children, Xioa E Tech, one of the biggest SAAS platforms in China, was selected. A 2 (group) x 2 (time) experiment was designed to explore whether saas-based mindfulness courses can replace trained mindfulness teachers. Ninety-two migrant school children participated in the study. All the students took pre-test and post-test of MAAS-C, POM, PANAS, and MQW. After a 6-week saas-based mindfulness practice, the mindfulness, inner peace, negative emotion regulation, and attention of the experimental group improved significantly. This result indicated that saas-based mindfulness courses could be an effective alternative for trained mindfulness teachers. It might solve the problems of children's mental health and the resources limitation of left-behind and workers' migrant children schools.

Keywords: saas · mindfulness · workers' migrant children · emotion · attention

1 Introduction

According to the World Health Organization, 10% of children and adolescents suffer from mental illnesse mainly caused by violence, bullying, poverty, or the mental illness of caregivers. In China, these problems are particularly true in left-behind children and workers' migrant children. Most of them are low self-esteem, inferiority, loneliness, social anxiety, and violence [1, 2]. Without the support and guidance of society, school or family, they may lead to a series of social problems in the future.

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Mindfulness is "an awareness that arises through paying attention, on purpose, in the present moment, non-judgmentally" [3].Bishop (2004) explained it as "the self-regulation of attention so that it can maintain on immediate experience" and "an orientation that characterized by curiosity, openness, and acceptance" [4]. This technique has been applied in various areas, such as parenting, competitive sports, business administration, and education[5]. Its effects on improving people's emotional state, cognitive function, pain tolerance, and stress regulation also have been proved in studies [6]. Therefore, some researchers have turned their attention to this technique and examed its influence on solving the problem of left-behind and workers' migrant children [7, 8]. However, operating mindfulness-related programs require trained teachers with some mindfulness practicing experience when teachers and funds shortage are common problems in the school of left-behind and workers' migrant children [9].

Benefiting from the 5G network facilities widely buildup in Chinese counties and towns, the software-as-a-service (SAAS) model with the advantages of lower purchase and system maintenance costs becomes a possible solution [10]. This essay first illustrates the requirements of the saas application for the mindfulness program in the school of left-behind and workers' migrant children. Then stating the technology solution that Xiao E Tech (a saas platform) provided. Finally, exploring the effectiveness of a 6-week mindfulness program based on Xiao E Tech in improving workers' migrant children's emotions and attention.

2 The SAAS Requirements

1. A platform that can save digital audios. The experienced mindfulness teacher can also upload and manage the audio courses online.
2. To satisfy the scenario of classes participating in the courses simultaneously, the saas needs to support different equipment to access it concurrently with the same account.
3. Users can access the courses through Wechat Mini Program
4. The cost should be acceptable because the funds of left-behind or migrant children's schools are not well-off.
5. To optimize the course design, the users' data from taking the courses should be recorded, such as the total duration of mindfulness practices and the courses' progresses.
6. It would be nice to have interactive features. For example, when the students have problems in mindfulness practice, they can leave messages to the experienced mindfulness teachers or discuss them in a mindfulness practice group.

3 A SAAS Platform: Xiao E Tech

Xiao E Tech is one of the most famous technological providers of paying for knowledge online based on the SAAS model in China. It can support graphic, audio, video, e-book, AI interactive classes, daily attendance, and data recording. After the courses are uploaded through the administrator port, users can log in the client port through Xiao E Tech's Wechat Mini Program, the mobile, or the computer application. There are three versions of its services. The standard edition (annual fee: 5,299RMB) can support the

audio and video class. Users can also add to a circle and record their daily attendance. Besides these, the professional edition, with an annual fee of 8999 RMB, supports having exams and providing certificates. The flagship edition is 19,999 per year. All the services of the standard and professional editions are provided. In addition, it supports e-booking, AI interactive classes, Q&A, and activities management.

Considering the funding problem of the school for left-behind and workers' migrant children, the standard edition of Xiao E Tech was purchased in this research. An expert with over six years of mindfulness practice experience recorded the audio courses and uploaded them through the administrator port. Migrant school teachers logged in to the platform via Wechat Mini Program and monitored students to have mindfulness practices. Most of the requirements for having the mindfulness course in the school of left-behind and workers' migrant children were well satisfied. However, multiple users logged in to one account together was not achieved. Therefore, in this research, teachers of different grades organized students to take mindfulness courses at different periods.

4 Research for the Effectiveness of SAAS-Based Mindfulness Courses

The effectiveness of teacher-giving mindfulness courses on students' motion and attention has been widely proven. For example, the performance of 58 fourth-grade pupils improved significantly in the Computerized Continuous Performance Task (CPT) after a 10-week mindfulness practice with trained teachers [11]. In addition, a mindfulness curriculum given by trained teachers decreased Portuguese elementary school students' suppression and indicated a better mood repair ability [12]. However, the saas-based mindfulness courses were lack of research. Therefore, in this study, a 2 (group) x 2 (time) experiment was designed to explore its effectiveness. We try to prove that the saas-based online mindfulness courses can be an alternative solution for improving students' emotions and attention when schools lack teachers and funds.

4.1 Participates

The study operated at Cao Yang workers' migrant children primary school in Guiyang, China. Students from Grade 3, Grade 4, and Grade 5 were divided into two groups by sorting their total exam scores of last semester from high to low and marking their names with the order of ABBAABBA…..The students marked with "A" were the experimental group, while those with "B" were the control group. Excluding those who dropped out during the experiment, finally, there were 46 students in the experimental group (Grade 3: 17Ss, Grade 4: 17Ss, Grade 5: 12Ss) and 46 students in the control group (Grade 3:18Ss, Grade 4: 16Ss, Grade 5:12Ss). All the participants had never taken mindfulness practice before.

One expert with over six years of mindfulness teaching and practicing experience recorded the mindfulness audio courses by referring to the book of Willard (2014) [13] and Snel (2021) [14]. Finally, there were six uploaded audio courses (about 20 min for each) on the Xiao E Tech platform.

Six school teachers logged in to the Xiao E Tech and organized the students of the experimental group to do the practice two times per week following the audios.

Table 1. The practice topics of the mindfulness courses

Week	Mindfulness courses
W1	Breathe Like a Frog
W2	Emotional Safety Island
W3	Love and Kindness
W4	Body Scanning
W5	Emotional First Aid Kit
W6	Mindfulness Listening

4.2 Instruments

The MAAS-C was used to measure the mindfulness level of the two groups. Its score ranges from 15 to 90. A higher score means a higher level of mindfulness level. The questionnaire of Peace of Mind (POM) was a supplementary measurement of mindfulness. It ranges from 5 to 35. The higher the score, the calmer the mind.

The Positive and Negative Affective Scale (PANAS) measured students' positive and negative emotions. The higher score in PANAS-P or PANAS-N illustrates the more frequency arising of positive or negative emotions separately.

The Mind-Wandering Questionnaire (MWQ) measured the frequency of existing mind-wandering situations. It shows the level of concentration.

4.3 Procedure

Before the experiment, students of both groups did the pre-test of MAAS-C, POM, PANAS, and MWQ.

In the following six weeks, teachers played the audio courses on Xiao E Tech during the lunch break two times per week for the experimental group. Each grade's students in the experimental group were organized by two teachers. These teachers also practiced the mindfulness courses together with the students. For the control group, homeroom teachers helped them with homework in the classroom during the lunch break.

The practice topics of the mindfulness courses on Xiao E Tech are shown in Table 1.

In the 7th week, students from both the experimental group and control group did the post-test of MAAS-C, POM, PANAS, and MWQ.

4.4 Results

Using independent samples t-test to compare the pre-test of the experimental and control group, as Table 2 shows, there was no significant difference between these two groups on any measure.

The Two-way repeated-measures ANOVA examines the effect of the saas-based mindfulness courses shown in Table 3.

The interaction effects of MAAS-C, POM, PANAS-N, and MWQ were noticeable. Their pairwise comparisons are in Table 4.

Table 2. Independent-samples T Test

	Group	N	M ± SD	Sig.	t	df
MAAS-C1	experimental group	46	63.39 ± 12.24	0.06	-1.88	90.00
	control group	46	68.17 ± 11.91			
POM1	experimental group	46	22.83 ± 4.59	0.83	0.21	90.00
	control group	46	22.63 ± 4.23			
PANAS-P1	experimental group	46	25.13 ± 5.63	0.25	1.15	90.00
	control group	46	23.80 ± 5.42			
PANAS-N1	experimental group	46	24.35 ± 6.32	0.96	-0.06	89.00
	control group	45*	24.42 ± 6.46			
MWQ1	experimental group	46	11.83 ± 4.86	0.65	-0.45	90.00
	control group	46	12.28 ± 4.80			

* one student didn't finish the PANAS-N1

In Table 4, the mindfulness level of the experimental group improved significantly after the 6-week saas-based mindfulness practices from 63.39 ± 12.45 to 74.33 ± 11.27 ($p < 0.01$). The POM also stated that the experimental group was more peaceful, while the average score of the control group decreased from 22.63 ± 4.22 to 20.26 ± 4.21. The difference between the two groups was significant at W6 with $p < 0.01$.

Moreover, the positive effect of the saas-based mindfulness practices on workers' migrant school-children attention was remarkable. After practicing, the score of mind-wandering for the experimental group decreased dramatically and showed a significant difference within ($p < 0.01$) and between the group ($p < 0.01$).

In addition, PANAS-N of the experimental group had shown that the practices help adjust the negative emotion. When the negative emotion arising frequency of the control group was increasing over time, that of the experimental group was relatively stable. After six weeks, the difference in the negative emotion adjustment was significant between the two groups ($p = 0.04$).

Table 3. Tests of Main Effects and Interaction Effect

		df	Mean Square	F	Sig.	Partial Eta Squared
MAAS-C	time	1.00	1000.93	29.41	<0.01	0.25
	Group	1.00	80.28	0.29	0.59	<0.01
	time * Group	1.00	1738.66	51.09	**<0.01**	0.37
POM	Time	1.00	2.40	0.32	0.57	<0.01
	Group	1.00	251.22	7.98	0.01	0.08
	time * Group	1.00	210.91	28.54	**<0.01**	0.24
PANAS-P	time	1.00	15.85	1.47	0.23	0.02
	Group	1.00	176.09	3.12	0.08	0.03
	time * Group	1.00	18.28	1.69	0.20	0.02
PANAS-N	time	1.00	18.76	1.54	0.22	0.02
	Group	1.00	135.19	1.62	0.21	0.02
	time * Group	1.00	109.29	8.98	**<0.01**	0.09
MWQ	time	1.00	78.26	9.66	<0.01	0.10
	Group	1.00	139.13	4.61	0.03	0.05
	time * Group	1.00	75.67	9.34	**<0.01**	0.09

Table 4. Pairwise Comparisons

	Experimental Group				Control Group				%1 and ③ Pairwaise Comparisons		%1 and ④ Pairwaise Comparisons	
	W0 ①	W6 ②	t	p	W0 ③	W6 ④	t	p	t	p	t	p
MAAS-C	63.39 ± 12.45	74.33. ± 11.27	-9.44	**<0.01**	68.27 ± 12.17	66.77 ± 13.97	1.15	0.23	-1.88	0.06	2.83	**<0.01**
POM	22.83 ± 4.59	24.74 ± 4.59	-3.24	**<0.01**	22.63 ± 4.22	20.26 ± 4.21	4.37	**<0.01**	0.21	0.83	4.87	**<0.01**
PANAS-N	24.35 ± 6.32	23.43 ± 7.89	1.30	0.21	24.52 ± 6.49	26.73 ± 6.89	-2.86	**<0.01**	-0.06	0.90	-2.00	**0.04**
MWQ	11.83 ± 4.86	9.24 ± 3.45	5.16	**<0.01**	12.28 ± 4.80	12.26 ± 4.20	0.03	0.97	-0.45	0.65	-3.75	**<0.01**

5 Conclusion

The mental health problems of left-behind and migrant children are receiving increasing attention from society. Mindfulness, a helpful technique to improve the emotions and attention of children, has been put forward. However, lack of funds and teachers is the challenge faced by the schools of left-behind and workers' migrant children. This research proposed to apply the SAAS model with the advantage of lower cost to solve these problems. An experiment exploring the effectiveness of saas-based mindfulness courses was designed. This research was based on Xiao E Tech, a saas platform, as it satisfied most of the requirements. After practicing mindfulness courses on it for six weeks, the mindfulness level, peaceful feeling, negative emotion regulation, and

attention of the experimental group improved significantly. These results indicated that saas-based mindfulness courses are alternatives for trained mindfulness teachers to some extent. It can be a solution for the schools of left-behind and workers' migrant children.

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