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The Effectiveness of a blog resilience programme for first-year basic organic chemistry students

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ABSTRACT
Teaching resilience to students is essential so that they can thrive in the face of adversity and develop into effective problem solvers. In this study, we developed a resilience intervention programme by using a blog platform and examined its effectiveness among first-year university students enrolled in a basic organic chemistry course. Based on the pre- and post-survey using the Resilience Scale-10 questionnaire, participants in the experimental group reported increased self-determination and adaptability to their new environment following their transition from high school to university life. Moreover, the paired *t*-test showed a statistically significant difference in participants' resilience levels after participating in the resilience activities ($p<.001$). Lastly, based on the reflective essays submitted, participants indicated increased motivation and enthusiasm for learning about organic chemistry in the future.

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Introduction

Incorporating resilience building into students is important in a future-ready educational system. This approach aims to improve the individual's resiliency to address the sudden transition, adversity, loss and risk situations that are plaguing us in today's world (Duchek, 2020). Furthermore, an educational system that promotes resiliency among students will enable them to experience the sense of competence, belongingness, motivation, self-determination, adaptation, usefulness and optimism in all their undertakings when they transit into employment later on (Schonert-Reichl & Lawlor, 2010). Over the years, many resilience programmes have been designed and implemented to strengthen resiliency among children and adolescents, particularly targeting those with some vulnerability, such as with disease or disability (García-Parra et al., 2021).

Resilience programmes are also gaining importance in today's conventional educational system. In Massachusetts (US), college students referred for counselling often present with depression, anxiety or other psychiatric problems (Kirsch et al., 2015). A recent survey carried out in India revealed that 50% of their participants, which consisted of university students, have experienced anxiety,

depression and stress due to various issues and psychological disturbance (Herbert & Manjula, 2022). 25 % of higher education students in Germany have had symptoms of burnout, and the rates of anxiety and depression among them were recorded as 17.4 % and 15.4 %, respectively (Lohner & Aprea, 2021). The COVID-19 surge worldwide has also exacerbated the mental health crises among children and adolescence (Meherali et al., 2021). A report showed that higher education students experience psychological disturbances including depression, anxiety and other affective disorders at a higher rate compared to general population (Pedrelli et al., 2015). Educators should consider higher education students as a vulnerable population and ensure their well-being as one of the important organisational goals for institutions of higher learning. This does not imply compromising academic quality but rather managing potential impact on the students' well-being.

Several resilience-related activities or programmes have been administered to the undergraduates of higher education institutions. For example, the use of resilience journals (Lohner & Aprea, 2021), fostering students resilience via development of supportive staff attitude and evidence-based practices (Brewer et al., 2022), outdoor adventure activity (Kelly, 2019), college dance training (Bohn & Hogue, 2019), yoga and mindfulness practice (Bartos et al., 2021), capacity building and prosocial programme led by youth (McCarty et al., 2022), implementation of community service-learning programme (Song et al., 2017). However, most of these resilience activities were conducted through face-to-face resilience training. The current trend of training students on resilience is shifted towards using the digital platforms. Reports have emerged on resilience programmes conducted online, such as the CORE programme (Herrero et al., 2019), Space for Resilience (Roig et al., 2020), the Online Positive Psychology Intervention (Yurayat & Seechaliao, 2021), internet-based multi-approach intervention (De Fabritiis et al., 2022). But the number of interventions available today are still insufficient for those who need them (Palma-Gómez et al., 2020). Online interventions offer potential solutions by providing global accessibility while promoting resilience and well-being through a medium that is accessible to everyone. Online interventions can play an important role in delivering content at little or no cost to individuals without requiring extensive assistance from psychologists or mental health therapists (Kazdin & Rabbitt, 2013).

Regarding the promotion of resilience intervention programmes among university science students. Limited studies were recorded in literature about their effectiveness (Robinson et al., 2021). An exception is Stoliker et al. (2022) who brought about positive change for nursing students exhibiting burnout and psychological disturbance. Organic chemistry is considered one of the toughest subjects at university level (Kan et al., 2015), yet no resilience programme has been implemented along with the teaching of this subject. Overall, resilience programs are important as they enhance students' self-determination and adaptability, particularly in challenging academic environments

Digital Platform as Medium of Course Content Delivery

The "e-learning" theory is grounded based on the use of technology to create new learning opportunity and promote effective learning among users (El-Sabagh, 2021). Over the decades, the web page or internet has become an essential medium in disseminating learning materials, as they can carry multiple multimedia elements such as the videos, interactive activities and reading materials (Manon, 2020). Apart from disseminating information, internet-based instructional learning encourages users to make connection to the course content and to share their thoughts through guided instruction (Buelow et al., 2018). Reformers grasp the opportunity to utilise the digital platform to introduce quality literacy to users (Demirezer and İlkörücü, 2023; Ikhsan et al., 2024; Nicholaidou et al., 2021; Ristanto 2022; Rusdiyana et al., 2024). This is evidenced by a previous study, in which a well-designed online course was shown to be able to motivate users learning in a particular subject. Study also revealed that an online course can promote effective study among learners just as much as conventional teaching (Biel & Brame, 2016).

The use of e-learning such as the social-media platform for delivery of learning content has been found to be effective, inexpensive, ease in use and accessible, making it a powerful tool that aids course

instructors in overcoming limitations in presenting course materials, relating new knowledge to existing knowledge more effectively and promoting creativity in teaching (Kidd, 2012). The use of social media in teaching enables collaborative learning among students, by allowing students to retrieve and share information online in the social media, such as through their mobile phones. According to one study, the use of social media proved to be very useful especially for students who feel uncomfortable to express themselves in front of their peers. This in turn opens another platform for collaborative learning and teaching which is also beneficial for students who are physically challenged. The outcome of above research shows that the use of social media has revolutionised the teaching and learning process, through enabling students to work collaboratively (Ansari & Khan, 2020).

Padlet

The bulletin board Padlet was co-founded by Nitesh Goel and Pranav Piyush, in San Francisco, California. It is an online and collaborative sharing platform that invites users to share and organize the information over the digital bulletin board or blog. Participants in Padlet can share their views, text, images, videos and reading materials in real time. Since the invention of Padlet, it has been used widely as a collaborative learning tool in higher education institutions (Ali, 2021; Ramachandiran & Mahmud, 2019). The Padlet was chosen in this study as it is aligned to the purpose of this study, which enable the experimental group participants from organic chemistry and course lecturer collaboratively work on a project, post reading materials and comment to achieve the interactive learning and resilience building. Furthermore, users can register Padlet basic feature for free.

While educators have begun to embrace social media as a teaching and learning tool, research addressing how blogs can facilitate resilience literacy among users remains scarce. Since blogging enables users to share comments, exchange ideas and reflect on learning experiences, blogs can be a potential platform for social constructivist learning (Liu & Chen, 2010). Literature suggests that blogging allows students to develop analytical thinking and enhance their learning to a higher level. This is because students need to understand, analyse and clarify their thoughts before starting to write in the blog about their feelings on a certain subject (Yang, 2009). Organic chemistry is widely perceived as one of the most challenging courses that a chemistry or science student must learn, which requires students to be able to reason, perform critical thinking, make judgements and solve the problems. Resilience learning can enhance motivation and confidence of students to learn difficult subjects, such as organic chemistry and other general courses.

Although many well-established approaches to teach resilience literacy have been described in the literature, there is still a scarcity of research that examines how blogging can facilitate resilience literacy among students. To address this research gap, this study aims to analyse the importance and effectiveness of existing "*We Lead You to Success*" resilience intervention from the perspective of undergraduate students undertaking the basic organic chemistry course. As such, the purpose of this research was set off such as listed below:

(1) How engaged are participants with the "We Lead You to Success" programme?
(2) What changes in resilience occur in participants before and after the implementation of the "We Lead You to Success" programme?
(3) What are the experiences of participants in the experimental group as reflected in their reflective writing?

Methods

Research Design

This study used the quasi-experimental method with the non-equivalent control group design conducted at Universiti Malaysia Terengganu, located in Kuala Nerus district in the Terengganu state of Malaysia at 2022/23 academic year. This method was preferred due to the easiness of implementation

and flexibility to compare the effectiveness of "*We Lead You to Success*" resilience intervention pre- and post-implementation strategy. The lesson plan of this course was included in the appendix section of this manuscript.

Participants

Prior to the commencement of academic year 2022, 36 participants (30 females and 6 males) from the control group and 36 participants (28 females and 8 males) from the experimental group who were studying basic organic chemistry at the Universiti Malaysia Terengganu (UMT), Malaysia, participated voluntarily in the current research. Prior to the commencement of this research, participants of the basic organic chemistry course were briefed on the purpose of this study and seek their consent that the data will be analysed for educational research purpose and the possibility of translating the obtained data into publication. Participants were subjected to Resilience Scale-10 (RS-10) questionnaire and required to submit a short reflective essay at the beginning, mid-term and after the end of the course. In addition, participants were asked to post a comment on Padlet after watching or reading resilience videos or materials given by the course lecturer. The use of Padlet in this study serves two functions. Firstly, all lecture notes and tutorial handouts regarding the basic organic chemistry course were uploaded on this webpage. Secondly, the course lecturer also uploaded the resilience videos and resilience study material on the same Padlet page. This ensures the participants not to miss out on the opportunity to be exposed to the resilience activity, and at the same time, access lecture notes and tutorial handouts for this course. Similarly, the same platform was used to post comments and reflections after watching the videos and resilience materials in the designated column. Their feelings and comments would be a source of motivation to others in the intervention group. To sum up, all the lecture notes, tutorial handouts, resilience videos, resilience materials and participants' feeling after watching the resilience videos were all posted on the Padlet wall, collectively known as the "We Lead you to Success: A Resilience Programme". This research has sought the consent of the ethics board of the University Malaysia Terengganu (UMT/JKEPM/2021/8).

"We Lead you to Success" Programme

At the beginning, the controlled class was designed so that the participants received only face-to-face teaching, while a Padlet wall together with the face-to-face teaching instructional method was implemented in the experimental group setting (Figure 1). The delivery of the resilience learning content in the experimental group was conducted using videos and resilience reading material adapted from Youtube and internet sources (Table 1). Starting from week 3, participants received a video or reading material regarding to the resilience learning. Students were asked to post their comment to the Padlet after watching the resilience videos or materials. In principle, the use of Padlet in this setting is to enable the administer of resilience learning to participants in the out of class setting to the experimental group. Yet, we found this method useful as previous study suggested the appropriate use of blog can enhance students' engagement in learning activities, both on- and off-campus (Ivala & Gachago, 2012). In this way, experimental group participants did not study in a passive way by merely discussing course content or tutorial, they were able to engage in the resilience programme designed by current course lecturer

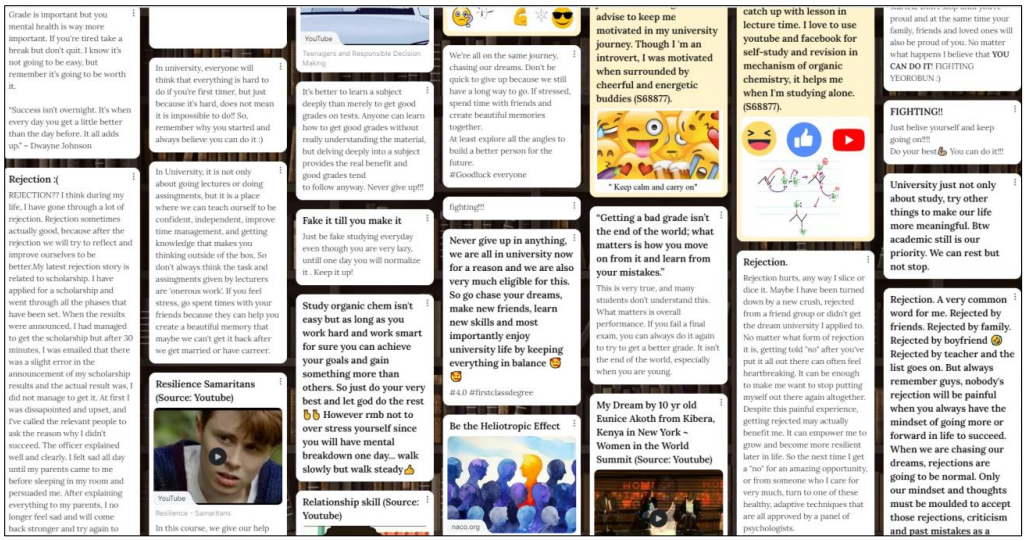
Procedure

Control Group: The basic organic chemistry course comprised of two one-hour lessons per week, for 14 weeks. The control class was designed to provide participants with face-to-face instruction and lessons from the beginning of the academic semester. An RS-10 questionnaire was administered on week one and again at the end of the course on week 14. group. The pre- and post- RS-10 survey forms

were administered to both control and experimental groups to examine students' self-determination and adaptability throughout the course of their basic organic chemistry learning. Figure shows the Padlet wall created for this study. In this course, the control group participants received similar course content as experimental group participants. In terms of assessment, two formative tests, each consists of (20 %), assignment (20 %) and final examination were subjected to control group participants. The similar assessment was applied to experimental group participants.

Figure 1

Padlet wall created for the resilience learning in basic organic chemistry course



Experimental Group with "We Lead You to Success: A Resilience Program": After obtaining consent from the participants, the corresponding author implemented the "We Lead You to Success" resilience enhancement programme to the experimental group, which consisted of 8 males and 28 females, alongside with face-to-face instructional learning. On week two, they were briefed on the concept of resilience via PowerPoint presentation, introduction to reflective essay, programme activity, and the use of Padlet containing study materials and videos in the resilience enhancement programme.

Starting from week three to week 13, this resilience enhancement programme utilised socio-emotional learning materials (Table 1) that are vital in promoting life skills, including healthy identity development, emotion management, interpersonal skills and responsible relationship. Through socio-emotional learning, students learnt to become more resilient by learning to cope and overcoming adversity and do not give up easily. There are many useful socio-emotional learning materials available for teaching and learning from online resources such as YouTube, which is available free of charge and educators can utilize these tools with their students or children on resiliency. The purpose of integrating Padlet into this setting was to ease the administration of resilience learning to participants beyond the classroom environment. The method employed proved useful, as previous research has shown that making appropriate use of a blog can increase student engagement in both on- and off-campus learning activities. By using this approach, participants in the intervention group were able to engage with the resilience program designed by the current course lecturer, rather than studying passively through discussions of course content and tutorials.

Table 1

List of resilience video and web study material

Week	Title of Resilience Video and Web Study Material
3	"*Resilience Samaritans*" - video
4	"*Eunice Akoth performs her poem "My Dream*""- video
5	"*Be the heliotropic effect*"- web study material
6	"*Exam stress relief and techniques*"- video
7	"*Learning to succeed by learning to fail*"- video
8	"*The science of gratitude*"- video
9	"*How socio-emotion learning benefits everyone*"- video
10	"*Self-awareness*"- video
11	"*Self-control*"- video
12	"*Relationship skill*"- video
13	"*Responsible decision making*"- video

From week 3 till week 14, students read up on the resilience materials and watched the videos adapted from YouTube to gain knowledge on resilience via the Padlet platform. Students' comments after reading and watching the resilience material or videos were monitored by the class lecturer. At week 2, 7 and 14, participants uploaded their reflective essays through the Google Forms to understand participants' own life experience, especially in the intervention group. To evaluate changes in participants' resilience before and after the programme, the Resilience Scale-10 (RS-10) [32] was administered to the participants on week 1 and 14. Participants' engagement on resilience activity posted over the Padlet was monitored by using questionnaire after week 14. Table 2 shows the implementation process for the resilience programme.

Table 2

Implementation process of the resilience program in the administered basic organic chemistry course

Week	Activity
Week 1	· Seek participants' consent on the current study.
Week 2	· Presentation on the concept of resilience. · Briefing on the resilience programme activity · Reflective essay submission by students (beginning stage)
Week 3-6	· Posting the video on Padlet and monitoring participants' comment
Week 7	· Mid-semester break
Week 8-13	· Posting the video on Padlet and monitoring participants' comments
Week 14	· Administering the Resilience Scale-10 (RS-10) to participants (post-survey) · Administering the questionnaire on the engagement of resilience programme · Reflective essay submission by students (end course stage)

Questionnaires

In this study, participants completed the Resilience Scale-10 (RS-10) (Jardim et al., 2021) and the questionnaire on the engagement of participants over Padlet. The former was directed to participants as questionnaire for the pre- and post-surveys to investigate participants' resilience change in the intervention and control groups during their first year at UMT. The second objective of this study was to measure changes in participant resilience before and after implementation of the "We Lead You to

Success" programme using the RS-10 questionnaire. The RS-10 questionnaire containing 10 questions with five-point Likert type items were used to elicit participant responses. The 10 questions or items were thoroughly reviewed by a panel consisted of 7 researchers from different areas, including psychology, education and management. These 10 questions were yielded as they were more likely to link to daily life of participants and without triggering memories of previous traumatic events. For the reliability of the measurement of RS-10, previous literature confirmed the robustness of this instrument, with Cronbach's alpha values between 0.81-0.84 (Jardim et al., 2021). In this research, a paired *t*-test was employed to analyse changes in participants' resilience between pre- and post-surveys. To measure participants' engagement on the activities posted on Padlet, frequency of visit to the Padlet was determined as wells as the answer-option type of feedback to the administered activities.

Prior to the statistical analysis using SPSS 20.0, the scores for items 1, 2, 3, 4 and 5 were recorded in the way that represented the self-determination factor and items 6, 7, 8, 9 and 10 recorded the adaptability factor of both control and experimental groups (Table 3). The gain scores (post-pre) for the self-determination and adaptability were calculated in the statistical analysis as dependent variables. Moreover, the authors also investigated whether the pre-scores could give an effect to the gain scores. In the descriptive data, no statistical difference was observed between self-determination pre-scores (F = 3.242, p = .08) and adaptability pre-scores (F = 1.931, p = .170) for both courses. To test for the internal reliability of factor 1 and factor 2 of the RS-10, Cronbach's Alpha values were calculated (Table 3). All the values were above the acceptable 0.7 value and are all in agreement with the previous literature (Jardim et al., 2021).

Table 3

The Cronbach's Alpha results for resilience program administered-basic organic chemistry course, Pre and Post tests

Cronbach's Alpha	Pre-survey	Post-survey
Self-determination	0.723	0.823
Adaptability	0.749	0.789

Reflective Essay

In this reflective essay, participants were asked to describe how they felt about their experience in learning of basic organic chemistry at the beginning, mid-term and at the end of the course. Over the years, a reflective essay was employed as an instructional tool for participants to express and reflect their perception on their learning activities (Cha *et al*., 2016). Participants' reflective essays were systematically analysed and reviewed by two of the authors who examined qualitatively on their writings to categorize the elements provided by the participants on their perception before and after the resilience program, as well as their comments on Padlet and also the current activity. After obtaining consent and categorisation from all authors, the current manuscript was prepared. The inter-rater reliability was 92 %.

Findings

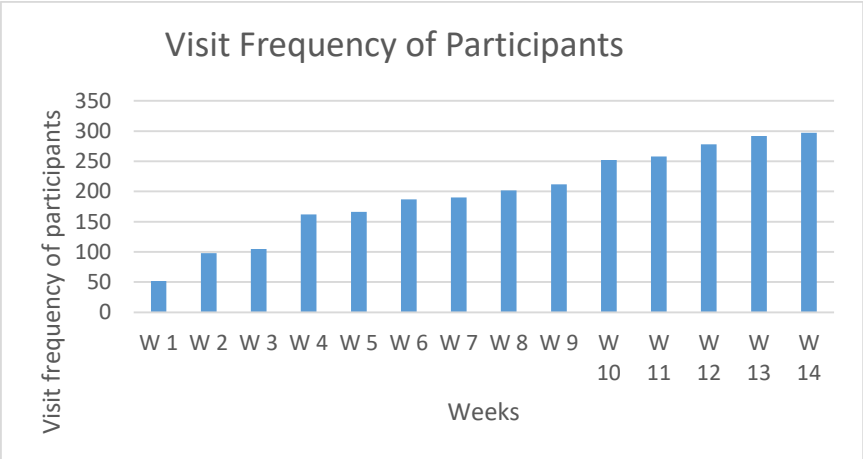
Participants' Engagement of The Resilience Programme Administered via the Padlet

For participants' engagement in the Padlet, based on the survey result, none of the participants encounter any issues during sign up and blog access as the account for Padlet is available for free on the internet. Participants needed to access the Padlet starting from week 3 to view the posted video and post their comments online. A quick survey on participants' engagement on Padlet was carried out

using Microsoft form administered to each student on weekly basis. The frequency of participant visits to Padlet was tabulated at the end of course as shown Figure 2. The result shows that the number of participant visits to Padlet increased steadily from week 1 to week 14. According to the survey results, each participant visited Padlet at least once a week (Total visits=52; M=1.4). Moreover, the number of visits from the participants increased from week 1 to week 14. During the final week, week 14, participants reported visiting Padlet more than 8 times a week (Total visits=297; M=8.25).

Figure 2

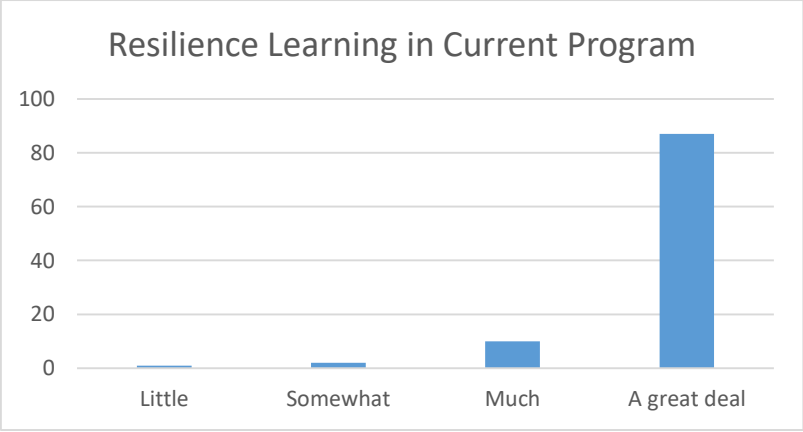
Frequency of participants visit on Padlet wall based on survey result



Participants in the resilience programme-administered basic organic chemistry group were asked to rate how their participation in the Padlet has enriched their learning in the resilience learning. Figure 3 shows that at the end of the course, about 87 % students suggested that the participation in the Padlet has enriched their resilience learning. 10 % of the participants found that the Padlet is much helpful in the learning of resilience. In the survey, only a small percentage of the participants suggested that the Padlet has somewhat (2 %) or little (1 %) effect helping them to study about resilience. We also found that participants who consistently visit and getting most out of the Padlet had consistently attended the physical class.

Figure 3

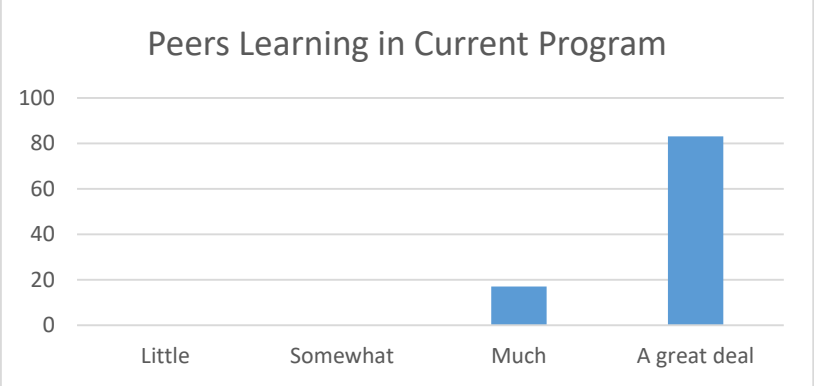
Participants feedback to question "How much did Padlet participation enrich your resilience learning



Participants were also asked whether the current activity posted on Padlet provided them with an opportunity to learn from their fellow classmates and hear their perspective. Approximately 83% of respondents affirmed that they significantly gained from their peers' comments on Padlet (Figure 4). Conversely, only 17% of participants claimed noteworthy acquisition from their classmates' comments on Padlet. Overall, 97% of participants provided feedback indicating they could apply the positive experiences they learned from their peers to overcome present and future obstacles.

Figure 4

Participants feedback to question "How much did this activity hosted in Padlet provide you an opportunity to learn from peers



Participants' Resilience Changes Before and After the Program

The results of one-way ANOVA test indicated that there was a significant difference between the experimental and the control groups, with gains in self-determination (F = 14.038, p<.001) and adaptability (F = 20.183, p<.001) in the experimental group (Figure 5). The effect size (eta-squared) was also examined within this study. Based on the result obtained, there was a small effect size existed for self-determination (eta-squared = 0.17) to medium (eta-squared = 0.23). Consequently, we can conclude that participants in the resilience programme-administered basic organic chemistry course experienced more self-determination and adaptability during their first year of study compared to the conventional course. Table 1 summarises the means and standard deviations for the items of Resilience Scale-10 for pre- and post-results in the controlled (n = 36) and experimental group (n = 36).

Figure 5

The mean sum scores for participants administered with resilience program in the basic organic chemistry course

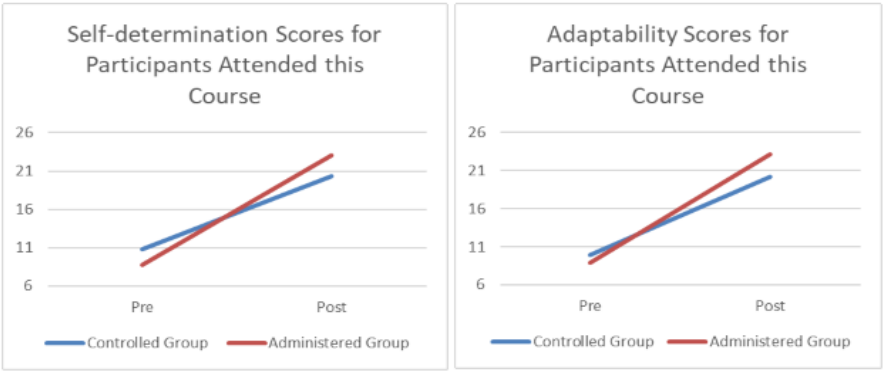


Table 2

Means and standard deviations for the items of Resilience Scale-10 for pre- and post-results in the control group (n = 36) and experimental group (n = 36)

Items	Control Group				Experimental Group			
	Pre		Post		Pre		Post	
	M	SD	M	SD	M	SD	M	SD
Factor 1: Self-Determination	10.83	4.103	20.334	4.338	8.778	3.599	23.056	3.074
1. I feel I know myself well.	1.750	0.770	3.834	0.910	1.694	0.668	4.361	0.762
2. I like myself just as I am.	1.722	0.779	4.056	0.791	1.583	0.649	4.778	0.485
3. I think I have the necessary skills to be successful in life.	2.056	0.826	4.194	0.856	1.8334	0.737	4.722	0.513
4. I feel comfortable with my body.	1.972	0.845	4.194	0.889	1.778	0.761	4.917	0.500
5. I feel I have good self-esteem.	2.000	0.793	4.056	0.893	1.889	0.785	4.278	0.815
Factor 2: Adaptability	9.861	4.142	20.139	4.318	8.889	3.756	23.139	3.193
6. I have total confidence in my skills to solve my problems.	1.917	0.692	3.861	0.931	1.801	0.668	4.722	0.513
7. I have been successful in overcoming difficulties in life.	1.944	0.860	4.000	0.756	1.722	0.815	4.528	0.609
8. I manage to minimize the negative effects of difficulties.	2.056	0.860	4.111	0.855	1.861	0.762	4.694	0.577
9. I take on my problems, giving them the importance they have, without undervaluing or overvaluing them.	1.834	0.910	4.139	0.867	1.611	0.803	4.611	0.688
10. When a situation cannot be changed, I accept the fact with serenity	2.111	0.820	4.028	0.910	1.889	0.708	4.584	0.806

Discussion

The discussion first reviews on the use of Padlet as a tool for resilience learning which was implemented online after the class each week. Based on participants' rich responses, one participant in the experimental group commented that the activities would be great if it could be carried out in the physical classroom. The result of this finding is consistent with a previous study (Ladyshewsky et al., 2012) where participants prefer to do learning activities in physical classroom. However, when online learning activities were introduced after the classroom setting, the learning process was found to be as efficient due to time limitation to cover the entire course content (Ivala & Gachago, 2012; Tagoe 2012). Undoubtedly, the advancement of technology has made learning easier and more flexible and has given lecturers more options to design content delivery such as recorded videos, YouTube videos and podcasts so that they are accessible to everyone at any time.

Participants also reflected on their feelings after being exposed to the videos and study materials related to resilience learning. Overall, 72 % of participants posted their comments at the end of course. The selected excerpts were also included in this manuscript. One of the predominant comments made by learners was encouragement to others not to give up so easily. The idea of the importance of mental health was also presented in one of the comments posted by participants via Padlet. Additionally, one of the participants indicated that the current programme promoted empathy among their peers as shown in one of the students' reflective essays. No doubt, a resilience programme that focuses on peer mental health support is important to promote self-recovery and efficacy of participants as proven in this study and previous research (Cooper et al., 2024). Resilience programmes promote pro-social behaviours and empathy among participants (Schonert-Reichl et al., 2012). Both collaborative learning

and positive social learning were achieved by the participants administered with the current programme. Moreover, this programme helped participants to explore, share, learn and practice the virtues gained. A similar effect was observed in previous studies where resilience programs for youth have resulted in positive outcomes, including social support among peers (Stokar et al., 2014).

In the current research, overall resilience scores for the experimental group were significantly improved, as well as scores on subscales of self-determination and adaptability among participants were significantly enhanced. The current study showed that participants in the experimental group were more self-determined and adaptable compared to the control group based on the RS-10 survey. In addition, the number of participants who experienced happy learning was found to be higher in the experimental group compared to control group.

As shown in one of the reflective essays after the course (Figure 6), students noted that they needed the intervention of the resilience programme to learn better and overcome difficulties in the course. Other comments included that they felt much better and experienced the process of happy learning when undertaking the resilience-related videos and materials on Padlet. It is noteworthy that the resilience activities will be efficient, if positive emotion was taught with the aid of the instructor that show positive affect to the younger generation (Bai et al., 2014). Overall, "We Lead you to Success: A Resilience Programme" has shown positive outcomes on students' learning that may be beneficial to future participants based on the reflective essay submitted by current participants.

Figure 6

One of the participants administered with resilience program in the basic organic chemistry course commented on the current activity

Learning organic chemistry and other chemistry related are fun even I think the subjects are difficult. However, with the help of current activity and guidance of a great and awesome lecturer, I was able to overcome the difficulty and was able to learn chemistry with fun.

Finally, we have examined participants' final exam performance, and the average scores were summarised as shown in Table 5. The average final exam score made by the experimental group was 67.4 %, higher than that recorded by the control group (61.2 %). Statistically, there was no significant difference between the final exam scores ($F = 15.412$, $p = 0.890$) for both groups. The result of this finding was in agreement with previous studies, which revealed higher motivation of learning was promoted among students though no immediate improvement in academic achievement observed (Liu et al., 2022; Macnamara & Burgoyne, 2023). As indicated by the above result, the resilience program administered participants felt more self-determined and adaptable in the new environment, emotionally happier and motivated to learn. The positive emotion and resilience promoted in this out-of-class program has impacted on participants emotionally and motivation to learn in the subject taught and thus led to a better final exam score as compared to the controlled group. In a previous study reported by Mäkinen (2021), blogging promotes a certain kind of intimacy and enable the sharing of details of an individual's life. Though bloggers might not want to share their whole stories of life or may be fragmented or curated part of life, what interest us was the blogs allows audience of getting a glimpse of someone's personal life and feelings. Sometimes, having a sense of knowing the bloggers as if like reading a blog of a friend. This presumed intimacy which can be considered as an affective 'glue' that capable to build the virtual

networks and enable blogging to become a meaningful way of connecting to the world of others, which can potentially lead to peers motivating in the time of adversity.

Table 5

Comparison of students' final exam marks for both intervention and control groups

	Control group (n = 36)		Experimental group (n = 36)	
	M	SD	M	SD
Average score	61.2	10.1	67.4	7.9

Limitations and Future Research

The population of participants in sample group was relatively small and the consequence of the resilience activities might not be felt by a larger group of participants. Moreover, the benefit showcased in this research to enhance on participants resilience was implemented awareness during their first-year undergraduate study. It does not guarantee participants will maintain the positive emotion throughout their duration of study in university or future lives. This research could be further expanded by involving participants from other courses to examine the effectiveness and explore its potential as a supplementary tool for enhancing resilience while tackling challenging concepts.

Conclusion and Implications

The purpose of the current research was to evaluate the effectiveness of a digital resilience program which employed Padlet, an online educational tool, in the after-class basic organic chemistry course session to build resilience among first-year undergraduate students. Previous studies have shown that the use of social media to instil learning activities after class session can benefit students and found to be much effective. As such, this study took advantage of Padlet and implemented the resilience activities as part of the instructional tool for participants in the learning of basic organic chemistry, as well as to promote collaborative and social learning skills. Based on the results obtained, the one-way ANOVA test indicated that there was a significant difference between the experimental and the control groups, with gains in self-determination (F = 14.038, p<.001) and adaptability (F = 20.183, p<.001) in the experimental group. Moreover, participants in the experimental group felt more self-determined and adaptable in their first year. In addition, the participants in the experimental group experienced happy learning when undergoing the resilience program compared to those in the control group. Moreover, participants indicated that they felt more motivated and energetic after completing with the resilience activities based on their submitted reflective essay. In education, resilience equips students with high achievement motivation and performance in learning, though with the presence of stressful events that might make students at risk of dropping out of university or school. In future, the current program can be used as a potential instructional tool to promote resilience learning among university students, especially after class session as an intervention programme for first year university students to foster resilience at university level.

Conflicts of Interest

The authors declare no conflict of interest.

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Appendix

LESSON PLAN
FACULTY OF SCIENCE & MARINE ENVIRONMENT (FSSM)

NAMA PENSYARAH : Assoc. Prof. Dr. Chia Poh Wai
PROGRAM :
NAMA/ KOD KURSUS: CHM3702
SEMESTER : I 2022/2023
KREDIT : 2 (2+0)
HARI/ MASA : Monday (4-6 pm), lecture room 4-07, level 4, central lecture complex

MINGGU (M) Week (M)	**TOPIK PENGAJARAN** Teaching topics	**CLO**	**AKTIVITI PENGAJARAN** Teaching activity	**AKTIVITI PENILAIAN** Assessment activity	**AFTER CLASS ACTIVITIES (*We Lead you to success program*)**
M1 (16 - 22 OCT 2022)	**CHEMICAL BONDING AND MOLECULAR STRUCTURE** • Chemical bonds – ionic bonds, covalent bonds • Lewis structure – drawing method, charge formalism • Resonance Structure - resonance theory, hybrid resonance, resonance structure sketch. • Determination of molecular shape (covalent bond) – length, bond strength, bond angle, molecular geometry • Sketching organic structure – solid structure, skeletal structure	At the end of the lecture students can: ♣ know the concept of chemical bonds ♣ Explain the basic concepts of chemical bonding, hybridization, resonance, stereochemistry, acid-base theory	Activities -Introduction and description of the course and its content. -review understanding with Kahoot quizzes. -gives watching videos to understand more clearly and interestingly	Mini project/assignment announcement (poster & mind map): - Make a mind map of the latest notes and info for each chapter for each group - students are divided into groups and given assignments (posters) related to PLO1 & PLO7.	

	• Hybridization- sp3, sp2, sp hybrid orbitals			-students are also required to upload the mid map and poster in the padlet	
M2 (23 - 29 OCT 2022)	**Deepawali holiday**				
M3 (30 OCT - 5 NOV 2022)	**ACID AND BASE THEORY** • Bronsted-Lowry definitions of acids and bases • Examples of Bronsted-Lowry reactions of acids and bases • Acid strength relationship with pKa value • Definition of Lewis acid-base • Examples of reactions Lewis acid-base-conjugate acid, conjugate base	At the end of the lecture students can: • Understand the definition of acid-base • Understand the types of acid-base reactions • Relate acid strength to pKa value	Activities- Introduction and explanation of the topic and its content -review understanding with Kahoot quizzes. -watch the video to understand more deeply about acid bases	Make a mind map of the latest notes and info for each chapter for each group	*"Resilience Samaritans"* - video
M4 (6 - 12 NOV 2022)	**INTRODUCTION TO FUNCTIONAL GROUPS** • Know the functional groups of organic compounds and classification based on functional groups (hydrocarbon compounds, alcohols, alkyl halides, ethers, epoxides, amines, carbonyl compounds) • Rules for Naming Organic compounds according to IUPAC	understand the types of functional groups of compounds	Activities- - description of the course and its content - review understanding with a kahoot quiz -Animated youtube videos about related	Make a mind map of the latest notes and info for each chapter for each group	*"Eunice Akoth performs her poem "My Dream""*- video

M5 (13 - 19 NOV 2022)	**ALKANE COMPOUNDS** • Classification of alkane compounds - aliphatic, cyclic (cycloalkane) • Naming according to IUPAC- aliphatic alkanes, cycloalkanes • Relationship of molecular shape with physical properties (boiling point, melting point and solubility) • Chemical properties of alkanes- o Fossil fuel alkane preparation reaction o Combustion reaction – results in CO2 and H2O o Radical reaction - Halogenation mechanism (chlorine and bromine)	At the end of the lecture students can: • Classify compounds • Apply the correct IUPAC naming system and stereochemistry to name an organic compound • Distinguish chemical properties	Activities- - description of the topic and its content -review understanding with a crossword quiz.		*"Be the heliotropic effect"* - web study material
M6 (20 NOV - 26 NOV 2022)	**ALKANE COMPOUNDS** • Conformation of aliphatic alkanes o eclipsed conformation o staggered conformation o anti conformation o gauche conformation o Newman projection o Conformational stability • Conformation of cyclic alkanes **STEREOCHEMISTRY** • Isomers- structural isomers, stereoisomers • Chiral or non-chiral molecules – related by exact overlap, plane of symmetry		Activities- - description of the topic and its content - instructional videos related to structures found in stereochemistry	**Test 1 (W6)** **TB** **(15%)**	*"Exam stress relief and techniques"* - video

M7 (27 NOV - 3 DIS 2022)	**STEREOCHEMISTRY …** • Stereogenic center (chiral carbon) – aliphatic alkanes, cyclic alkanes • Determination of R and S configuration:- Cahn–Ingold–Prelog rules • Diastereomers & meso compounds	At the end of the lecture students can: • Distinguish the structure of isomers	Activities- - description of the topic and its content - instructional videos related to structures found in stereochemistry		*"Learning to succeed by learning to fail"*- video
4 - 10 DEC 2022	**MID-SEMESTER BREAK**				
M8 (11 - 17 DEC 2022)	**ALKENE COMPOUNDS** • Classification of alkene compounds - terminal and internal alkene, cycloalkene. • Alkene naming according to IUPAC • Naming stereoisomers - cis, trans, E and Z • Relationship between molecular shape and physical properties (melting point, boiling point and solubility) • Chemical properties of alkenes -	At the end of the lecture students can: • Distinguish the structure of isomers	Activities- - description of the topic and its content - instructional videos related to structures found in stereochemistry		*"The science of gratitude"*- video
M9 (18 - 24 DEC 2022)	**ALKENE COMPOUNDS …** o Alkene preparation reaction – alkyl halide dehydrohalogenation, alcohol hydration o Hydrohalogenation reaction (electrophilic addition of HX (hydrogen halide) - mechanism, Markovnikov rule, stereochemistry of electrophilic addition reaction.	At the end of the lecture students can: • Distinguish the type of alkene reactions	Activities- - description of the topic and its content		*"How socio-emotion learning benefits everyone"*- video

	o Hydration reaction-reaction mechanism o Halogenation reaction- mechanism, stereochemistry of halogenation. o Halohydrin formation reaction - melanism, stereochemistry and regioselectivity. o Hydroboration-oxidation reaction – mechanism.				
M10 (25 - 31 DEC 2022)	**ALKYNE COMPOUNDS** • Alkyne classification - terminal and internal alkyne, cycloalkyne • Naming of alkyne compounds according to IUPAC • Relationship between structure and physical properties (melting point, boiling point, solubility) • Chemical properties of alkynes -	At the end of the lecture students can: • Apply the correct IUPAC naming system and stereochemistry to name an organic compound • Distinguish chemical properties	Activities- - description of the topic and its content - related instructional videos		*"Self-awareness"*-video
M11 (1 - 7 JAN 2023)	o Alkyne preparation reaction – example: HX elimination reaction (from geminal and vicinal dichloride) o Addition reaction of alkyne compounds - addition mechanism of HX, X2, H2O, hydroboration-oxidation) o Acetylide- anion formation reaction from terminal alkyne (because sp hybridized C-H more acidic than sp2 and sp3), reaction with HX.	At the end of the lecture students can: • Distinguish the type of alkyne reactions	Activities- - description of the topic and its content - related instructional videos -review understanding with Kahoot quizzes		*"Self-control"*-video

M12 (8 - 14 JAN 2023)	**AROMATIC COMPOUNDS** • Naming compounds derived from benzene- mono substituted, disubstituted, poly substituted. • Aromatic Criteria- Huckel's Rule • Spectroscopic analysis of benzene compounds	At the end of the lecture students can: • Familiarize yourself with the naming of compounds derived from benzene	Activities- - description of the topic and its content - related instructional videos -review understanding with Kahoot quizzes		*"Relationship skill"*- video
M13 (15 - 21 JAN 2023)	**AROMATIC COMPOUNDS …** Electrophilic substitution reactions of benzene o Halogenation reaction o Penetration reaction o Sulfonation reaction o Friedel-Crafts alkylation reaction o Friedel-Crafts reaction	At the end of the lecture students can: • Understand substitution reactions	Activities- - description of the topic and its content - related instructional videos -review understanding with Kahoot quizzes		*"Responsible decision making"- video*
M14 (22 - 28 JAN 2023)	**Chinese New Year Holiday**				
M15 (29 JAN -4 FEB 2023)	**Study Week**				
M16 (5 – 11 FEB 2023)	**Final Examination**				