

# Effects of Participatory Teaching Approach for Red Cross First Aid Trainers of China in 2019: A Before-and-After Study

**Xiaoqing Cheng**

Chinese Red Cross National Training Center

**Xiaohua Zhang**

Chinese Red Cross National Training Center

**Qinghui Ma**

Chinese Red Cross National Training Center

**Ying Wen**

Chinese Red Cross National Training Center

**Jianzhong Zhao** (✉ [zhaojzh@126.com](mailto:zhaojzh@126.com))

Chinese Red Cross National Training Center


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## Research Article

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# Abstract

## Objective

Red Cross Society of China has always attached importance to training of first aid trainers. Participatory teaching approach has good effect and great significance all over the world. Thus this methodology was introduced from International Federation of Red Cross and Red Crescent Societies to China from 2019. This study aimed to investigate effects of participatory teaching approach in training first aid trainers from provincial branches of China.

## Method

We conducted a cross-sectional study among first aid trainers from Red Cross provincial branches. Pretested electronic questionnaire was given before and after the training. Data was collected by online survey tool and logic check was set to ensure quality of data. Stata version 11.0 was used to analyze the data. Proportion were used to describe social-demographic characteristics of respondents and their satisfaction with different teaching modules. Paired two-tailed t-test was used to compare the confidence scores before and after training. Chi-square test was used to test confidence growth of different groups and among different developing level regions. Difference was statistically significant if  $P < 0.05$ .

## Result

772 first aid trainers participated in the survey with a response rate of 99.6%. The majority of respondents were satisfied with standard modules of this course using participatory teaching approach. Scores on 4 confidence related questions had all increased and the confidence growth was statistically significant (Question1:  $t = -32.66, P < 0.001$ ; Question2:  $t = -28.22, P < 0.001$ ; Question3:  $t = -27.41, P < 0.001$ ; Question4:  $t = -29.07, P < 0.001$ ). Different groups had different confidence growth and medium confidence group had the biggest increase in all 4 questions (Question1:  $2 = 166.49, P < 0.001$ ; Question2:  $2 = 166.48, P < 0.001$ ; Question3:  $2 = 195.40, P < 0.001$ ; Question4:  $2 = 129.61, P < 0.001$ ). No statistical significant difference was found among different developing level regions.

## Conclusion

Participatory teaching approach was well accepted among Red Cross first aid trainers from provincial branches all over China. No statistically significant was found among different developing level regions. This teaching approach could improve the confidence of participants. It is reasonable to promote this methodology among first aid trainers nationwide.

## Introduction

First aid training is one of the statutory duty and key priority of Red Cross Society of China (RCSC). According to our annual statistics, over 3 million first aider were trained each year. Now RCSC has more than 20 thousand first aid trainers nationwide. These specialized trainers play a vital role in first aid training, which directly determine the quality of training. Thus, RCSC has always emphasized the construction of trainer cultivating system.

RCSC applied for 'International First Aid Attestation (IFAA)' from International Federation of Red Cross and Red Crescent Societies (IFRC) in 2019 aimed to set higher course standard and continue to improve first aid training quality. IFAA request the trainers to use participatory teaching approach in first aid education and teach first aid technology which is consistent with *International First Aid and Resuscitation Guideline 2016* [1]. RCSC had translated the guideline into

Chinese and developed textbooks in accordance with the guideline. The textbooks and Chinese version guideline were distributed throughout the whole country. RCSC also asked all the branches to conduct first aid training under 'four unify' principle, which include unified syllabus, unified technology standard, unified assessment standard and unified certificate. All these work foundation lead to the success of obtaining IFAA in September 2019.

The original course for first aider included Cardiopulmonary Resuscitation, Trauma Rescue, Accidental Injury and Disaster. IFRC certificated first aider course includes the same contents as the original course except using the participatory teaching approach. Thus RCSC needs to promote this new methodology while disseminate first aid knowledge to the public.

Participatory teaching approach is a mature teaching approach introduced to China from the late 20th century. By using scene simulation and other participatory activities, this approach takes learners as the center of class and encourage learners to fully participate in the entire teaching process. The aim is to enable learners to deeply understand and master first aid knowledge and skills they have learned and apply them to future social practice flexibly.

At present, the research on participatory teaching is still in its infancy. There are very few research achievements, especially when combining with the real situation and specific subject. RCSC used to pay more attention to first aid knowledge and skill, but pay no sufficient attention to teaching techniques. Now we begin to combine the new approach with first aid training and designed a study to see whether first aid trainers can accept this new approach and are willing to apply it in their future training. So we conducted IFRC standard course for trainers using participatory approach in all 34 provincial branches, and surveyed all the participants' attitude towards this course. Hopefully, the result of this study can support policy makers to promote better first aid training in the future.

## **Methods**

### **Ethics Statement**

Ethics committee of Chinese Red Cross National Training Center(CRCNTC)had approved this study. Respondents' written informed consents were obtained by administrative staff of provincial branches who had been trained about the ethics requirement. All questionnaires were completed by the respondents themselves to ensure the reliability. Professional staff check the data daily to control the quality and keep the database confidential and anonymous.All methods were carried out in accordance with relevant guidelines and regulations.

### **Study Design And Settings**

This survey was a cross-sectional,institution-based and before-and-after study which was conducted in 34 provincial RCSC branches including Hong Kong and Macau. Participants were all registered first aid trainers who finished this participatory standard course. Questionnaires were given to them both before and after the course to identify their attitude towards the training.

### **Data Collection Tools And Procedures**

This study was a census which covered all the first aid trainers attended this course. Professional staff of RCNTC designed a structured questionnaire and pretested it. The questionnaire includes three parts. The first part of the questionnaire is about the basic social-demographic characteristics such as sex, age, ethnic, education, major, teaching experience, etc. The second part is about scoring the whole course and every module of this standard course to identify

respondents' satisfaction. The third part has four questions related to respondents' confidence that was used to assess first aid trainers' confidence growth. The questions are mainly from IFRC standard 'Trainer of trainers' textbook. Researchers of RCSC translated and adjusted the questions according to the local context and the literatures review result to make sure respondents can understand the questions and the Chinese version was translated back into English to ensure consistency. The questionnaire was pretested on 82 senior first aid trainers from different provincial branches before this survey formally started.

Electronic online survey tool(Wenjuanxing, Changsha Ranxing Information Technology Co., Ltd., Changsha, China) was used to generate a two-dimensional code and set logic quality check to make sure the finished questionnaires was filled and corrected. Participants scanned the QR code of the electronic questionnaire and finish all the questions, then the data was collected and stored automatically behind the scenes. Data was checked daily to ensure the reliability. Database could be exported to regular EXCEL format which can be analyzed by specialized statistical software such as Stata version11.0.

## Statistical Analysis

The exported database had been checked and cleaned thoroughly by the online tool. Then the database was transported into Stata version 11.0 for further analysis. Count and proportion were used to describe social-demographic characteristics of respondents and their satisfaction with different teaching modules. Mean and standard deviation were used to describe the quantitative variables. Four point Likert scale was used to identify respondents' attitude towards each module. Paired two-tailed *t*-test was used to compare the confidence scores before and after training. Chi-square test was used to test confidence growth of different groups and among different developing level regions. Difference was statistically significant if  $P < 0.05$ .

## Results

### Social-demographic Characteristics of Respondents

The study surveyed 775 trainers and 772(99.6%) of them responded, which included 473(61.27%) female. The minimum and the maximum age of them were 20 and 69 years respectively. The mean age of them was 40.26 with a standard deviation of 8.67. Han Chinese took the most proportion(86.66%). 589(76.29%) respondents had a Bachelor's degree or above. Most of the respondents (62.69%) had medicine related professional background. The majority of the respondents (87.82%) had taught first aiders before and 82.64% of them taught both theoretical and practical courses. About half of the participants had less than 3-year teaching experience and about one third of them had 4 to 10 years experience while the others had taught for more than 10 years. Their major target learners were from commercial or workplace. Almost all the respondents didn't take first aid training as primary source of income (Table 1).

Table 1  
Social-demographic Characteristics of Respondents

<b>Variables</b>	<b>No.</b>	<b>%</b>
Sex		
Female	473	61.27
Male	299	38.73
Age(in year)		
20–30	105	13.60
31–40	296	38.34
41–50	272	35.23
51 and above	99	12.82
Ethnic		
Han Chinese	669	86.66
Minorities	103	13.34
Level of education		
Below Bachelor	183	23.71
Bachelor Degree	520	67.36
Master degree	61	7.90
PhD	8	1.04
Major		
Medicine related	484	62.69
Others	288	37.31
Had trained first aiders before		
Yes	678	87.82
No	94	12.18
Teaching type		
Theoretical and practical course	638	82.64
Theoretical course	24	3.11
Practical course	110	14.25
Teaching experience(in year)		
< 1	55	7.12
1–3	314	40.67
4–5	126	16.32
6–10	161	20.85

Variables	No.	%
> 10	116	15.03
Major target learners		
Volunteers	178	23.06
Commercial/workplace	275	35.62
Students	181	23.45
Others	138	17.87
Take first aid training as primary source of income		
No	714	92.49
Yes	58	7.51

## Satisfaction With Different Teaching Modules

Respondents were asked to score their satisfaction with the course from 1 to 10 to represent their satisfaction degree from lowest to highest. The average score was  $(9.01 \pm 1.40)$ . 694(89.9%) respondents scored 8 and above, which revealed most of the respondents were satisfied with this training.

This standard course was designed by IFRC. It included 15 modules which were highly relevant to first aid technology and participatory teaching approach. Four point Likert scale including strongly agree, agree for positive attitude and disagree, strongly disagree for negative attitude was used to find respondents attitude towards each module. According to the result, the three most satisfying modules were The Red Cross, Course reflection and Adult Learners. And the three least satisfying modules were Course Accommodations, Conflict Resolution and One-On-One Feedback(Table 2).

Table 2  
Satisfaction with Different Teaching Modules

Module	Strongly agree		Agree		Disagree		Strongly disagree	
	No.	%	No.	%	No.	%	No.	%
Role and responsibilities of a Trainer	607	78.63	161	20.85	1	0.13	3	0.39
The Red Cross	629	81.48	139	18.01	1	0.13	3	0.39
Instructional Activities	599	77.59	169	21.89	1	0.13	3	0.39
Effective Trainer and Communication	606	78.50	162	20.98	2	0.26	2	0.26
Adult Learners	610	79.02	159	20.60	1	0.13	2	0.26
Supporting Learning	600	77.72	168	21.76	2	0.26	2	0.26
Coaching in First Aid Training	601	77.85	168	21.76	1	0.13	2	0.26
Course Accommodations	581	75.26	184	23.83	5	0.65	2	0.26
Conflict Resolution	579	75.00	186	24.09	5	0.65	2	0.26
Assessment and Evaluation	590	76.42	180	23.32	0	0.00	2	0.26
Organizing a First Aid Course	593	76.81	174	22.54	3	0.39	2	0.26
Facilitation Practice #1(Group)	602	77.98	165	21.37	3	0.39	2	0.26
Facilitation Practice #2(Individual)	603	78.11	166	21.50	1	0.13	2	0.26
Course Reflection	611	79.15	158	20.47	1	0.13	2	0.26
One-On-One Feedback	599	77.59	166	21.50	5	0.65	2	0.26

## Confidence Growth Of Respondents

4 questions related to respondents' confidence were designed. Respondents were asked to scale their confidence from 1 to 9 both before and after the course. The questions were as below:

Q1: How prepared do you feel you are to be a qualified First Aid Trainer?

Q2: How prepared do you feel you are to act as a component of quality management process in relation to first aid education?

Q3: How prepared do you feel you are in maintaining a psychologically safe learning environment?

Q4: How prepared do you feel you are in measuring and evaluating study outcomes?

Average score for Q1 increased from 5.73 to 7.49. Average score for Q2 increased from 6.08 to 7.63. Average score for Q3 increased from 6.37 to 7.80. Average score for Q4 increased from 6.19 to 7.66. All average scores had increased statistically according to paired *t*-test. And Question1 had the maximum growth (Table 3).

Table 3  
Average Confidence Score of Respondents

Question	Before course	After course	<i>t</i>	<i>P</i>
1	5.73 ± 2.11	7.49 ± 1.55	-32.66	< 0.001
2	6.08 ± 2.14	7.63 ± 1.60	-28.22	< 0.001
3	6.37 ± 2.02	7.80 ± 1.47	-27.41	< 0.001
4	6.19 ± 1.92	7.66 ± 1.47	-29.07	< 0.001

Respondents were grouped according to the original confidence score they gave themselves before the training. Respondents who scored themselves 1 to 3 were low confidence group. Those who scored themselves 4 to 6 were medium confidence group. Those scored themselves 7 to 9 were high confidence group. The score they gave themselves after the training was analyzed to identify if the growth was different among 3 groups. Data showed median confidence group had the maximum growth while high confidence group had the minimum. Difference was statistically significant (Table 4).

Table 4  
Confidence Growth of 3 Different Groups

Question	Confidence growth	Total No.	Low confidence group		Medium confidence group		High confidence group		$\chi^2$	<i>P</i>
			No.	%	No.	%	No.	%		
1	Higher	600	122	92.42	324	92.84	154	52.92	166.49	< 0.001
	Same	150	10	7.58	21	6.02	119	40.89		
	lower	22	0	0.00	4	1.15	18	6.19		
2	Higher	553	86	88.66	300	90.91	167	48.41	166.48	< 0.001
	Same	200	11	5.50	26	7.88	163	47.25		
	lower	19	0	0.00	4	1.21	15	4.35		
3	Higher	530	63	87.50	289	93.23	178	45.64	195.40	< 0.001
	Same	222	9	12.50	18	5.81	195	87.84		
	lower	20	0	0.00	3	0.97	17	4.36		
4	Higher	566	69	86.25	296	91.64	201	54.47	129.61	< 0.001
	Same	185	10	12.50	23	7.12	152	41.19		
	lower	21	1	1.25	4	1.24	16	4.34		

## Total Confidence Score Among Different Developing Level Regions

Add all the scores of 4 questions together to generate total confidence score before and after the course. The minimum and the maximum were both 4 and 36. The mean score before training was 24.37 with a standard deviation of 7.55. And the mean score after training was 30.57 with a standard deviation of 5.73. Both before and after course total score were divided into groups: 22 and below, 23 to 29, 30 and above.



Provinces were grouped into East (highly developed areas), Middle (Moderately developed areas) and West (Less developed areas) according to classification standard of *Communiqué on the Main Data of the First National Economic Census (No. 1)* [2]. Total confidence score of trainers from different regions were compared using Chi-square test. No statistical significant difference was found among regions (Table 5).

Table 5  
Total Confidence Score among Different Developing Level Regions

Classification	Region	≤ 22		23–29		≥ 30		$\chi^2$	P
		No.	%	No.	%	No.	%		
Before course	East	105	37.23	103	36.52	74	26.24	3.14	0.54
	Middle	74	41.81	52	29.38	51	28.81		
	West	120	38.34	100	31.95	93	29.71		
After course	East	24	8.51	60	21.28	198	70.21	2.04	0.73
	Middle	20	11.30	35	19.77	122	68.93		
	West	26	8.31	73	23.32	214	68.37		

## Discussion

### Status Quo and Basic Characteristics of Red Cross First Aid Trainers

RCSC doesn't have enough qualified, registered first aid trainers. *Healthy China initiative 2030* [3] requires that by 2022 and 2030, the certificated first aider in China should take a proportion of 1% and 3%. Research [4] had showed there were 24585 registered Red Cross first aid trainers till the end of 2018. Also, talent drainage and lack of professional enthusiasm lead to a further loss of trainer. That means more qualified trainers should be cultivated as soon as possible. Since first aid education is statutory duty and key priority of Red Cross and Red Crescent movement, years of solid work had good effect in community, school and workplace [5]. We need to continue with these traditional work, this also requires enough active, capable trainers. Now RCSC doesn't have enough trainers to achieve this goal. We need to establish a stable trainer system.

According to RCSC previous research [4], male and female trainers took similar proportion. The average age was 40.08 ± 8.72. Most of them had medicine related education background and several years of teaching experience. More than 90% of the trainers were part-time and don't take first aid training as their principle source of income. Also, trainers of Norway take work place as the most common source of training [6], which is similar to our study. All these characteristics were similar with the respondents of this study, which make the respondents of this study representative.

### First Aid Course of RCSC

Study [7] shows that when immediate assistance is provided within 5 minutes after the accident, the wounded survival rate is 85%, while over 15 minutes it is 72%, and 20 minutes from the event it is 60%. So first aid plays a crucial role in saving lives and reducing mortality. Lay people can also play an important role in emergencies, but only when they have enough skill, confidence and willingness to provide assistance [8].

Although there may exist some bias stop researchers from finding out which population may benefit most from first aid training [9], it is certain first aid course can be very effective among different population. Traditional first aid course

emphasized mainly on Cardiopulmonary Resuscitation, Trauma Rescue, Accidental Injury and Disaster Rescue. What is most important about first aid education is constructing learners' confidence so they will be willing to help others in future emergency. Some researchers tried to add new content such as psychological first aid, but no overall significant differences were found for learners' confidence [10]. Since learners' theoretical first aid knowledge was worse than expected [8], efforts should be made to transform the theoretical training into the practical training [11] and add new teaching tools [12]. Interactive activities which allow learners to explore and discuss can effectively increase their willingness and confidence to help once they are in an emergency [13,14]. New teaching approach such as peer-education and scenario-based approach were experimented, the result showed participation in a first aid training improved self-efficacy [15,16]. First aid programs that prepare learners to overcome inhibitors in emergency could lead to better help and higher helping rates [17,18].

## **Effect of Participatory Teaching Approach in Teaching First Aid Trainers**

In order to continuously improve the training quality and give learners an appealing experience, RCSC brought in a standard IFRC trainer curriculum using participatory teaching approach from 2019. This curriculum includes practical training, peer-education and scenario-based activities, which may be an important complement to first aid knowledge and skills. Our curriculum was designed with reference to IFRC standard 'Trainer of Trainers' textbook included 15 standard modules and adjusted according to biology of learning and teaching [19]. All the modules should include at least an energizer, formal lecture and participating activities to transfer education and first aid knowledge to the trainees. The aim of this curriculum was to immerse trainees in a participative environment, to learn both knowledge and pedagogy, and to expect them to apply participative approach into future first aid education.

First Aid education needs more practice than just theory [20]. Participatory teaching approach is a learner-centered, scenario-simulated and various teaching resources-motivated approach which gives learner good learning experience. This approach had been proved useful in some population like medical student [21,22] and some subject [23]. We assumed this approach might help the learners to immerse themselves in specific trauma/respiratory arrest and cardiac arrest situation and apply their knowledge and technology to save people's life. And we had completed a research [24] in 2019 which showed the first batch of 82 senior trainers trained by participatory approach were satisfied and had confidence growth after the training. So we do this further research to find out whether it is feasible to promote this course on a wider scale.

## **Effectiveness of IFRC Trainer Course**

There are 4 questions covering four different dimensions of confidence. All the self-scoring had increased significantly. Respondents were more confident in being a qualified trainer than supporting quality management of a psychologically safe learning environment and evaluating learning outcomes. According to Table 1, the average scores of Question 1, 2 and 4 increase more than Question 3, possible reason is that the trainer management and continuous evaluation have long been a Red Cross first aid training focus content. But maintaining a safe psychological learning environment is relative less mentioned. The IFRC 2016 guideline focuses on "First Aid education", thus in the future we may add highly relevant theories such as participatory teaching and psychological learning environment in first aid education.

Respondents had varied self-scoring before the course in all 4 questions, but different confidence group all had statistically significant confidence growth. Median confidence group had more growth than low confidence group and high confidence group. But the increasing range was not as much as the previous research among 82 senior trainers [24]. Canadian Red Cross found significant heterogeneity in learner outcomes varied by different provinces [25]. We

found respondents with different baseline confidence had different confidence increase, but we didn't find region heterogeneity in our study. Thus it is proper to promote this course in our country.

There are 15 standard modules in the course. The Red Cross, Course reflection and Adult Learners are the 3 most satisfying modules. In traditional first aid training, The Red Cross is a conventional popular session which distinguish red cross first aid training from other commercial training. But there used to be no reflection. Since this is also a beneficial teaching approach [26] and is well accepted among first aid trainers, we should emphasize this part in future first aid training. Adult learners have different characteristics comparing with children[27]. The 2016 IFRC Guideline requires national red cross society to create educational programmes for children and adult, according to their cognitive, social and behavioural abilities. It is suggested that we should attach importance to the teaching of adult learner and develop courses for different populations to achieve good first aid training effect.

## Conclusion

This study highlights the satisfaction and confidence growth of Red Cross first aid trainers from provincial branches after a standard participatory curriculum. And no statistically significant was found among different developing level regions. We hope this study may provide useful information to policy-maker, and supporting their decision of promoting this participatory course among first aid trainers nationwide. Further research needs to be considered to confirm the validity of participatory approach in teaching not only first aid trainers but also first aiders.

## Abbreviations

RCSC, Red Cross Society of China; IFRC, International Federation of Red Cross and Red Crescent Societies; IFAA, International First Aid Attestation; CRCNTC, Chinese Red Cross National Training Center

## Declarations

### Supporting Information

Correspondence and requests for supporting materials should be addressed to J Zhao.

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### Competing interests

The authors have declared that no competing interests exist.

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## References

1. International Federation of Red Cross and Red Crescent Societies. International first aid and resuscitation guidelines 2016. 2016. Available from: [https://www.ifrc.org/Global/Publications/Health/First-Aid-2016-Guidelines\\_EN.pdf](https://www.ifrc.org/Global/Publications/Health/First-Aid-2016-Guidelines_EN.pdf)
2. The state council. Communiqué on the Main Data of the First National Economic Census (No. 1). 2016. Available from: [http://english.www.gov.cn/archive/state\\_council\\_gazette/2015/06/05/content\\_281475121384971.htm](http://english.www.gov.cn/archive/state_council_gazette/2015/06/05/content_281475121384971.htm)
3. National Health Commission of the People's Republic of China. Healthy China Program (2019-2030) .2019. Available from: <http://www.nhc.gov.cn/guihuaxxs/s3585u/201907/e9275fb95d5b4295be8308415d4cd1b2.shtml?from=timeline&isappinstalled=0>.
4. Bianca Reveruzzi, Lisa Buckley, Mary Sheehan. School-Based First Aid Training Programs: A Systematic Review. *J Sch Health*. 2016 Apr; 86(4):266-72. DOI:10.1111/josh.12373.
5. X Cheng, J Zhao, S Yun, Q Wang. Status analysis of Red Cross Society of China registered first aid trainers[J]. 2020,8(10):541-544. DOI:10.13919/j.issn.2095-6274.2020.10.001.
6. Bakke Håkon Kvåle, Steinvik Tine, Angell Johan, Torben Wisborg. A nationwide survey of first aid training and encounters in Norway. *BMC Emerg Med*, 2017 Feb 23; 17(1):6. DOI: 10.1186/s12873-017-0116-7.
7. Witold Pawłowski, Dorota Lasota, Krzysztof Goniewicz, Mariusz Goniewicz. Effects of first aid training in emergency preparedness and response. *Medical studies/Studia Medyczne*. 2018;34(3):259-263. DOI:10.5114/ms.2018.78691.
8. Heard CL, Pearce JM, Rogers MB. Mapping the public first-aid training landscape: a scoping review. *Disasters*. 2020 Jan;44(1):205-228. DOI: 10.1111/disa.12406.
9. Zhimin He, Persephone Wynn, Denise Kendrick. Non-resuscitative first-aid training for children and laypeople: a systematic review. *Emerg Med J*. 2014 Sep;31(9):763-8. DOI: 10.1136/emermed-2013-202389.
10. Marit Sijbrandij, Rebecca Horn, Rebecca Esliker, Fiona O'May, Relinde Reiffers, Leontien Ruttenberg, et al. The Effect of Psychological First Aid Training on Knowledge and Understanding about Psychosocial Support Principles: A Cluster-Randomized Controlled Trial. *Int J Environ Res Public Health*. 2020 Jan 11; 17(2):484. DOI:10.3390/ijerph17020484.
11. 김민, 김민, 김민. Knowledge level and recognition in first-aid depending on completion of first aid training. *Korean Journal of sports science*. 2019; 28(6):721-730. DOI:10.35159/kjss.2019.12.28.6.721.
12. 김민, 김민. Educational Tool for First Aid Training Using an Optical See-through Head Mounted Display. *Japanese Journal of Educational Media Research*. 2017; 23(2):35-45. DOI:10.24458/jaems.23.2.35.
13. Emily Oliver, Jane Cooper, David McKinney. Can first aid training encourage individuals' propensity to act in an emergency situation? A pilot study. *Emerg Med J*. 2014 Jun; 31(6):518-20. DOI:10.1136/emermed-2012-202191.
14. F Li, J S Zhang, X Y Sheng, J L Wang, X M Shen, W P Xia, et al. Effects of three different first-aid training methods on knowledge retention of caregivers and teachers: a randomized and longitudinal cohort study in China. *Public Health*. 2020 Jan;178:97-104. DOI: 10.1016/j.puhe.2019.08.021.
15. Anna Tóth, Henrietta Bánfai-Csonka, Attila Pandur, Bence Schiszler, Balázs Radnai, József Betlehem, et al. Peer-education in primary schools – is it an effective way of mass first aid training? *Resuscitation*. 2019 Jun 27;142(supplement 1):e73-e74. DOI:<https://doi.org/10.1016/j.resuscitation.2019.06.177>.
16. Kate Luckie, Bandana Saini, Yien Yien Soo, Vicky Kritikos, Jack Charles Collins, Rebekah Jane Moles. Impact of scenario based training on asthma first aid knowledge and skills in school staff: an open label, three-arm, parallel-group repeated measures study. *J Asthma*. 2019 Sep;56(9):973-984. DOI: 10.1080/02770903.2018.1508471.
17. Stijn Van de Velde, Annemie Heselmans, Ann Roex, Philippe Vandekerckhove, Dirk Ramaekers, Bert Aertgeerts. Effectiveness of nonresuscitative first aid training in laypersons: a systematic review. *Ann Emerg Med*. 2009 Sep;

- 54(3):447-57, 457.e1-5.DOI:[10.1016/j.annemergmed.2008.11.005](https://doi.org/10.1016/j.annemergmed.2008.11.005).
18. J Breckwoldt, C Lingemann, P Wagner. Resuscitation training for lay persons in first aid courses: Transfer of knowledge, skills and attitude. *Anaesthesist*. 2016 Jan; 65(1):22-29. DOI: [10.1007/s00101-015-0113-8](https://doi.org/10.1007/s00101-015-0113-8).
  19. James E. Zull. *The Art of Changing the Brain: Enriching the Practice of Teaching by Exploring the biology of Learning*. 1st ed. Virginia 2016: Stylus Publishing, LLC; 2002.
  20. Menti L Ndile, Britt-Inger Saveman, Anne H Outwater, Dickson A Mkoka, Susann Backteman-Erlanson. Implementing a layperson post-crash first aid training programme in Tanzania: a qualitative study of stakeholder perspectives. *BMC Public Health*. 2020 May 24; 20(3):750. DOI: [10.1186/s12889-020-08692-8](https://doi.org/10.1186/s12889-020-08692-8).
  21. Margarita Rubio, María Sánchez-Ronco, Rosa Mohedano, Asunción Hernando. The impact of participatory teaching methods on medical students' perception of their abilities and knowledge of epidemiology and statistics. *PLoS One*. 2018 Aug 22; 13(8):e0202769. DOI: [10.1371/journal.pone.0202769](https://doi.org/10.1371/journal.pone.0202769).
  22. Beatriz Gal, Margarita Rubio, Eva Iglesias, Purificación González. Evaluation of participatory teaching methods in undergraduate medical students' learning along the first academic courses. *PLoS One*. 2018 Jan 18; 13(1):e0190173. DOI: [10.1371/journal.pone.0190173](https://doi.org/10.1371/journal.pone.0190173).
  23. Aguilera, Perales-Palacios. Learning biology and geology through a participative teaching approach: the effect on student attitudes towards science and academic performance. *Journal of Biological Education*. 2020; 54(3):245-261. DOI: [10.1080/00219266.2019.1569084](https://doi.org/10.1080/00219266.2019.1569084).
  24. Cheng XQ, Zhang XH, Wen Y, Ma QH, Chen J, Zhou Nan, et al. Research on training effect of the first batch international first aid certified advanced trainers in China. *Chinese Journal of Public Health Management*. 2020; 36(5):Forthcoming.
  25. Joanna Muise, Emily Oliver, Penny Newell, Mark Forsyth. Improving individuals' propensity to act in a medical emergency: A quasi-randomised trial to test the impact of a learning intervention. *Health Education Journal*. 2019; 78(2):214-225. DOI: [10.1177/0017896918796030](https://doi.org/10.1177/0017896918796030).
  26. William T Branch Jr, Anuradha Paranjape. Feedback and reflection: teaching methods for clinical settings. *Acad Med*. 2002 Dec; 77(12 Pt 1):1185-8. DOI: [10.1097/00001888-200212000-00005](https://doi.org/10.1097/00001888-200212000-00005).
  27. Joshua A Daily, Benjamin J Landis. The journey to becoming an adult learner: from dependent to self-directed learning. *J Am Coll Cardiol*. 2014 Nov 11; 64(19):2066-8. DOI: [10.1016/j.jacc.2014.09.023](https://doi.org/10.1016/j.jacc.2014.09.023).