



HAL
open science

TRIZ Training in Pandemic Time

Malgorzata Przymusiala

► **To cite this version:**

Malgorzata Przymusiala. TRIZ Training in Pandemic Time. 22th International TRIZ Future Conference (TFC), Sep 2022, Warsaw, Poland. pp.470-478, 10.1007/978-3-031-17288-5_39 . hal-04449794

HAL Id: hal-04449794

<https://inria.hal.science/hal-04449794v1>

Submitted on 15 Feb 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



This document is the original author manuscript of a paper submitted to an IFIP conference proceedings or other IFIP publication by Springer Nature. As such, there may be some differences in the official published version of the paper. Such differences, if any, are usually due to reformatting during preparation for publication or minor corrections made by the author(s) during final proofreading of the publication manuscript.

TRIZ Training in Pandemic Time

Malgorzata Przymusiala¹

¹ Novismo sp. z o.o., Warsaw, Poland

malgorzata.przymusiala@novimo.com

Abstract. Pandemic time forced us to change our life. Suddenly we faced many new problem to solve. One of them was the following contradiction: we have to stay isolated and we have to continue our activities. In case of lectures and training it seemed to be quite easy: go online. The Internet is available almost everywhere and it offers many opportunities to teach/to learn while remaining at home. Unfortunately, many things went wrong and many students and teachers soon started to dream to come back to face-to-face classes. The article is a case study based on own experiences of remote training, which have been highly rated by participants. It is a practical example of using TRIZ at TRIZ training, a suggestion which TRIZ tools are useful at teaching online and explanation how we use them in our everyday practice.

Keywords: TRIZ, Training, Online, Communication, Experience.

1 Basic contradiction: training must be continued and training cannot be continued

The SARS Covid-19 pandemic surprised the whole world. Schools and universities suddenly had to be closed, training had to be cancelled. People had to continue their educational activities, they could not pretend they had holidays. How could we describe this situation? From the TRIZ point of view it was a typical physical contradiction: classes must be continued as they cannot be suspended or postponed indefinitely and training cannot be continued because people have to stay at home. The solution seemed quite obvious, even for those not familiar with formulating and solving contradictions: to replace face-to-face meetings with video conferences, with meetings online. Internet is available almost everywhere, most of people has computers or at least smartphones [1], so the idea of lessons/training online is a great solution.

2 Disappointing remote classes

After two years of pandemic restrictions, many people claim that working online, especially online courses, is not as great solution as they expected. What is the cause of the disappointment? The list of causes is long: no or too few computers at home (imagine a family of two adults and two or three children of school age), insufficient

Internet bandwidth, no separated spaces for each family member working at the same time, etc. On the other hand, the companies had similar issues: too few computers, no procedures of remote work, no experience with online tools and no knowledge about them. People complained about no direct contact among people, boredom, lack of discipline, etc.

As we have no influence on many of the items mentioned above, we will focus only on the things that we were able to change.

3 What had to change

The key to a success is to understand that online training is totally different from the standard one and there is a lot of preparation work to do before launching remote classes. It is not just talking to the audience using computer: the content must be structured in a new way as well as the new strategy of classes must be developed. Online tools must be chosen and tested earlier. Talking heads on a computer screen are unacceptable as boring and ineffective [2].

4 Training before pandemic

Novismo sp. z o.o. launched TRIZ L1 training in accordance with the International TRIZ Association (MA TRIZ) requirements [3] in 2017. During three-day classes we met the participants at lecture halls, conference rooms, etc. The agenda included 24 – 30 class hours, divided into 1,5 hour blocks. Each participant got a set of printed materials covering the whole presentation used during classes. A lot of content to comprehend in a very short time. As we met face-to-face, it was possible to use some props (toothbrushes, watches, school rulers, etc.) as a support to trainers' explanations and a way to make training more attractive for students. In post-class surveys participants rated the training as interesting (mean score 4,5 on a scale from 1 to 5; 328 trainee, 26 groups) and useful (mean score 4,1 on a scale from 1 to 5, 328 trainee, 26 groups), but challenging, and they complained about being exhausted afterwards (81% of 328 trainee).

How could it all be changed to cope with working online? How to convert our standard classes to successful online training? We decided to apply TRIZ tools: to study 40 Inventive Principles and check which recommendations could be useful to improve the online classes.

5 TRIZ Tools / 40 Inventive Principles

The classical TRIZ tools are based on patents analysis. Genrich S. Altshuller, the creator of TRIZ, focused on patents relating to solving contradictions and he noticed some regularities: the recurring schemes of conflicts as well as the recurring patterns of solutions. That was the starting point to formulate 40 Inventive Principles – models of solutions [4]. Here are examples how we used some of these models at improv-

ing online training. We found the following Inventive Principles especially useful in remodelling our classes: 1, 2, 3, 5, 6, 10, 15, 20, 21, 23 and 25. The below explanations reveal details and give some practical hints.

6 Inventive Principle no.1: Segmentation

- Divide the object into independent parts.
- Make the object easy to disassemble.
- Increase the degree of fragmentation or segmentation of the object.

6.1 Time – changes in the agenda

The 90 minutes blocks are too long, people are unable to maintain the level of attention for such a long time [5]. The risk of mind wandering is higher when taking into consideration the online conditions: there are many distracting factors, more than in classrooms.

Our first decision was to change the agenda: instead of 90 minutes block, our online class hour lasts 45 minutes. It is highly appreciated by the participants: in the post-class survey people claim they are not exhausted, in spite of 8 class hours a day. (67% of 328 trainee, 29 groups taught remotely).

As we observed that each activity online takes at least 20% more time than offline, we decided that the L1 training online, including the certification exam, would last four days, instead of three days, as we used to do it before pandemic. It made no sense to plan 10 hours of classes a day – we wanted to teach people, not to torment them.

Hint: To manage time well we ask participant to be punctual and we use timers. The first timer, 45 minutes countdown, is visible for the trainer only. The second one, 10 minutes countdown, showing the remaining break time is visible for the participants on the screen shared during breaks (we ask participants to stay logged in during breaks). You can use a timer application embedded in Windows system, or choose another one from the variety of timers available online and free of charge [6].

6.2 The content divided into modules

The whole content of the training is divided into modules. When necessary it is easier to adjust the agenda to meet the customers' expectations (e.g. to convert the 4 full days to 8 days, 4 class hours each). It is also convenient for participants as each module is accompanied with a separated set of printed materials.

6.3 Changes in slides

The presentation used during standard offline training had to be modified. In a classroom the participants focus their attention on the trainer and the slides are not crucial. While online, the slides on the screen shared by the trainer must be attractive enough

to focus attention and to keep it focused for 45 minutes. To learn how to remodel our slides, how to do it right we completed additional training for trainers and studied some helpful books [7] and we did our best to implement the gained knowledge. First of all, we try to follow the rule *one piece of information on one page* – it makes the content easier to understand and to memorize. When a slide is full of tables, figures and long texts the audience will try to read it instead of listening to the trainer. It is more distracting than helpful.

In our opinion it is better idea to cut the content into small pieces and not to worry about a big number of slides: our *Function Analysis of Devices* module includes over 200 slides. We remember that we cannot eat an elephant with a single bite, but we can do it piece by piece.

6.4 Breakout rooms

Each training includes some practical exercises, when the presented theory can be immediately tested. It is the time when we divide the whole group of participants into smaller teams (2 – 4 persons). It is easy to do in a classroom, but now it is also available online, using breakout rooms offered by Zoom (the option also available in other applications). The trainer, who is a host of the meeting, decides about the number of rooms and assigns people to rooms. The group can be divided into rooms automatically. Even though the team members are assigned automatically, the trainer is able to transfer people among the breakout rooms.

Team members can use their cameras and microphones to communicate within a room. They are able to share their screens and send text messages as well. Using the breakout rooms is also a way to check the presence: to enter the room a person must accept the invitation, so the host can immediately see who is logged in but away. It is possible to set the time how long the rooms are active, they remain open until the host accepts to close them, though. The rooms can be renamed, i.e. *Anna's team*.

7 Inventive Principle no.2: Separation

- Separate any interfering parts or properties from the object, or single out the only necessary part (or property) of the object.

7.1 No cameras

Some participants are surprised when they learn that cameras will not be used. In our opinion cameras are one of the most distracting factors: instead of following the lecture people observe themselves, observe each other, observe the interiors behind the other people, etc. We do not use cameras, we ask participant to focus on the screen shared by the trainer. Cameras can be used only at the beginning, just to say 'hello', but they should be turned off immediately afterwards.

7.2 Changes in slides

We make our best to present the content in the way it is easy to grasp and to memorize. We avoid filling slides with blocks of text, we try to use only the minimum of words, we use symbols, figures and colours. We reduce text as it takes more time to read and to comprehend. On the other hand, the participant can take notes in paper materials as the slides are not overloaded so there is enough space for handwritten remarks.

7.3 Changes in communication

Good communication is a base of a good remote training. We encourage people to use status icons to communicate: to confirm their presence, to indicate a question or a comment. This way the trainer can immediately check the presence and control activity of each participant.

Hint: we recommend using status icons rather than chatting as reading text takes more time than a reaction to the icon.

7.4 Paper materials

Each training participant receives a set of paper materials, but they are not just a copy of slides presented by the trainer. The slides on printouts are nearly the same, but we have left some places blank – to be fulfilled by the participant during the training. There are several advantages of such solution: people have to take notes. It means they have to listen carefully to the trainer and react. Handwriting supports memorizing [8], so the effectiveness of classes increases. As during the exam it is allowed to use all the notes, books and other available sources, it is recommended to have the completed set of materials on hand.

8 Inventive Principle no.5: Merging

- Bring closer together (or merge) identical or similar objects, assemble identical or similar parts to perform parallel operations.
- Make operations contiguous or parallel; bring them together in time.

We merged the online tools into our standard classes. To avoid a boring lecture, we reach for different online tools: quizzes and spreadsheets shared by linking in the Zoom chat window. As they are well rated by the participants, we included them in standard classes – on condition participants have computers connected to Internet. The links and/or files are being sent by e-mail or copied from a pendrive. Previously we had the same exercises in offline versions only (printed in paper materials), now a student can decide if he/she writes the answers on paper or uses the computer.

9 Inventive Principle no.6: Universality

- Make a part of the object, or the entire object perform multiple functions; eliminate the need for other parts.

9.1 One set of printed materials

To keep the things simple we use the same presentations and the same printed papers for online classes as well as for those offline. The customers can change their minds whether they want an online training or an offline version – there is no need to prepare a different set of materials.

9.2 Using popular Internet tools

Some of the companies prepare their own tools to be used and shared online and store them on their own servers. To prevent unauthorised access they build sophisticated structures on their own servers: users have to log in, to enter passwords etc. To avoid any problems with access restrictions, we use popular websites open to the public. We use Google Forms and Google Sheets – the main advantage is their file formats are accessible and readable for Microsoft Office users as well as for Apple systems users. The needed files are just linked in the chat window. The files themselves are blank and useless for non-participants, so there is no risk even in case of unauthorised access or copying.

10 Inventive Principle no.10: Preliminary action

- Make any changes in the object (either fully or partially) before such changes are required.
- Pre-arrange objects so that they can be quickly activated without losing time delivering them.

Generally, remote training must be well prepared in advance: it cannot be just a copy of a standard classes, not just a lecture transmitted online. Each detail must be set to achieve the goal of keeping participants focused and active.

10.1 Online presentation

We strongly recommend to analyze presentations used so far. We observe that in many cases trainers forget that slides must be helpful for participants, not to be just a content reminder for the speaker! If necessary, an additional set of materials must be prepared for the students, but the presentation slides cannot include all the details of content as it is a highly distracting factor: instead of listening, people try to read texts, diagrams and tables on a slide.

10.2 Online tools

All the tools and files helpful during the training have to be prepared in advance. It takes some time, but the same files can be used many times. The only thing to do before another training is to remove the previous answers from the form or just to make a new copy of previously used form. If anything is being sent by e-mail (links or exercises files), it is good idea to compose the messages (or at least drafts) before and make sure that none of the attachments is left out.

10.3 Introduction to online communication

To be sure that every person can fully take part in classes, we have to start the meeting introducing the rules of communication. That is the reason why we have prepared an additional set of several slides just to explain all the technical details. We are aware that there are many kinds of software used for online meetings. They are similar to each other, but there are some differences that must be explained in the beginning to avoid interruptions during training.

11 Inventive Principle no.15: Dynamization

- Allow changes (or design such changes) in the characteristics of the object, external environment, or process that optimize the object, or that optimize the operating conditions.
- Divide the object into parts capable of moving relative to each other.
- If the object (or process) is rigid or inflexible, make it movable or adaptable.

11.1 Changes in slides

We dynamized most of slides in our presentations to make them more attractive. We use animations: the objects appear on a slide in a sequence, to illustrate the trainer's words.

11.2 Short films to illustrate examples

As the online mode excludes any props, any object that could be given to participants' hands, we use short films instead – it is a further step on the way of the picture dynamization. Even though a film is not embedded in a slide, it could be easily presented by immediate sending a relevant link to participants – online meeting tools offer a chat window to communicate with written texts and links or to send files.

Hint: When sharing a film, make sure you also share the sound – check the settings of your online meeting tool.

11.3 The final test

The final test is an inherent part of a training. The Google tools offer many settings to adjust forms to the individual requirements. The one worth recommendation is the possibility to shuffle the questions as well as to shuffle the answers to each question. This way it is enough to prepare only one set of questions of the final test as each student will get his/her unique version. People do not realize they answer the same set of questions and the risk of cheating is reduced.

12 Inventive Principle no.20: Continuity of useful action

- Carry on work continuously; make all parts of the object work at full load, all the time.
- Eliminate all idle or intermittent actions or work.

12.1 Recordings

We have prepared the recorded lectures for the participants. The whole training content is divided into modules and each person can come back to the chosen module and to watch it online any time. The links are active for 60 days after the training.

12.2 Constant improving

We thoroughly read the participants' opinions expressed in post-class surveys and try to follow the suggestions what and which way could be improved. Even if the participants are satisfied and the scores are high, we do our best to present the most up-to-date pieces of information, we change the examples. The new examples also facilitate the trainer's work: repeating the same things many times is boring.

13 Inventive Principle no.21: Skipping

- Conduct a process, or certain stages of it (e.g. destructible, harmful or hazardous operations) at high speed.

The exam online has two important advantages: firstly, as we use Google Forms the part of trainers' work has been skipped and the test answers are checked automatically. The second advantage is a result of the first one: the results of the test are known immediately, the trainer can share them with the participants.

14 Inventive Principle no. 23: Feedback

- Introduce feedback (referring back, cross-checking) to improve a process or an action.

- If feedback is already used, change it.

14.1 Questions and answers any time

At the very beginning of classes we inform the participants it is not a standard lecture. We reserve the right to ask questions any time, but on the other hand, we encourage the participant to ask their questions any time. This is also another way to verify the presence of each person.

Hint: In larger groups we recommend to use a paper list of participant's names to tick to be sure everybody is asked.

Hint: After each answered question we make sure we are fully understood. It is also good to be prepared for several ways to explain one thing, to have more different examples.

14.2 The post-class survey

We ask the participant to share their opinion in a post-class survey. It is also a Google form, but the answers are fully anonymous. It is a good source of information about the audience's expectations and about items to be improved.

15 Inventive Principle no. 25: Self-service

- Make the object serve itself by performing auxiliary helpful functions.
- Use waste resources, energy, or substances.

Many things mentioned above can be understood as an implementation of the Inventive Principle no.25. The participant cannot be just logged in and remain inactive, they are forced to be focused: they have to take notes as there are many blank places in printed materials, they have to answer questions than can be asked any time, they have to enter the breakout rooms and work in small teams. This way we effectively control the presence even though the cameras are off.

16 Summary

For those who know and use TRIZ the remote training is not a surprise. We can say it is a way to dynamize the training – it complies with the Trend of Dynamization. We have just to accept it, whether we like it or not. We have shared our own experiences and prompted some hints as we believe it is evitable to work remotely.

We constantly work on our training to make them as attractive and effective as possible. In our opinion it is a must as there is at least one but a very serious reason to continue training online: cost savings. In case of online classes we can skip the travels, hotels, conference rooms. We save time and money. We can be more flexible to

meet the customers' expectations and match their calendars. We expect that many customers will prefer to work remotely, even when the pandemic is over.

References

1. BankMyCell Homepage, <https://www.bankmycell.com/blog/how-many-phones-are-in-the-world>, last accessed 2022/03/08
2. <https://www.science.org/content/article/lectures-arent-just-boring-theyre-ineffective-too-study-finds>, last accessed 2022/03/11
3. International TRIZ Association Homepage, https://matriz.org/wp-content/uploads/2021/01/Appendix-1_Knowledge-Standard-ENGL-2017-03-1.pdf, last accessed 2022/03/10
4. Novismo sp. z o. o Homepage, <https://novismo.com/altshullers-matrix/?lang=en>. last accessed 2022/03/10
5. <https://journals.physiology.org/doi/full/10.1152/advan.00109.2016>, last accessed 2022/03/11
6. <https://www.online-stopwatch.com/> last accessed 2022/03/11
7. Bucki, P.: Porozmawiajmy o komunikacji, 1st edn. Wydawnictwo Słowa i Myśli, Lublin (2017)
8. <https://www.sciencenewsforstudents.org/article/handwriting-better-for-notes-memory-typing>, last accessed 2022/03/10