

traininglab

CHEMISTRY AND FUN IN ONE BOARD GAME

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1-Synopsis

Traininglab is an **applied board game** designed to **help young people learn the very basics of Chemistry** in a distended, pleasant and motivating way.

Times change. People change. The whole world changes. It is designers' job to detect these changes and adapt their work to them. In the end, we are supposed to think with the main goal of making people's life something better, aren't we?

As said, so, people has obviously changed in the last few years. Nowadays, we are not just looking at the functionality of things. We want something more than this. Some marketing experts call it 'the added value', a clear example about this is Apple. Why do we see an iPhone or an iMac as a beautiful and attractive product? As rational beings, we humans are in a constant search of happiness. We want something more than 'functionality' in all the areas in our lifes. We love fun, we love surprise, we love pleasure... We love to feel motivated and engaged to whatever we do.

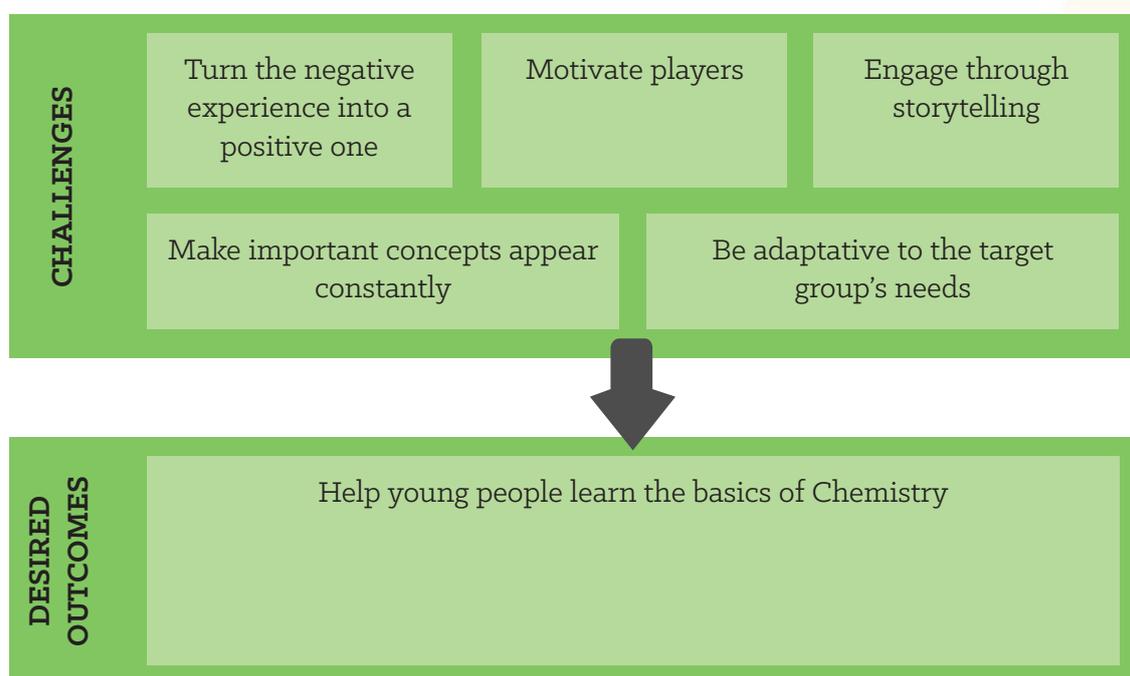
Traininglab aims to exactly achieve this: making the process of learning the basics of Chemistry a **memorable experience** in order to really succeed in the transmission and comprehension of this knowledge.

2-Objectives

The main goal that this project faces is, as explained before, to **help young people learn the basics of Chemistry** in an easier and better way. To achieve this desired outcome, the game has to succeed in some derived challenges:

- Turn the negative experience of learning something complex and apparently boring into a **memorable** one.
- **Motivate** players.
- 'Paint' information with an attractive layer of **storytelling**.
- Make the **important concepts constantly appear** in the gameplay.
- **Be adaptative** to the target group's needs and mindset.

Besides the main objective, which is directly related to potential consumers, this project has a second purpose: research in the field of board games. These kind of games, really popular not many years ago, have nowadays noticeably lost people's interest. This is not due to their essence but to the fact that they haven't evolved to fulfill contemporary media consumption trends and needs. Therefore, this project is a great opportunity to re-research how can board games become an attractive product for contemporary costumers again. More information about this is provided in the chapter 6 of this memory.



3-The subject

As explained in the previous chapters of this memory, Traininglab is an applied board game, which means that it has a purpose besides fun itself. In this case, **the subject behind the game is Chemistry, and specifically its basics** represented by the periodic table of elements. It is important to make clear what does the game include and which knowledge aims to transmit.

Moreover, as the main goal of the project is to teach, **the knowledge behind it has to be 100% reliable and adapted to the target group**. That's why **several experts (both in Chemistry and in Chemistry teaching) have been contacted** and asked to collaborate as specialists in the topic.

3.1- Knowledge definition & limits

As Traininglab has been designed as a tool to make the first contact with Chemistry, it doesn't aim to teach high level knowledges in this area. **Only the basic concepts and rules are present in the game**. This doesn't mean, however, that it couldn't be adapted to more complex pieces of knowledge. As discussed in the chapter 6 of this memory, Traininglab has been designed to be adaptative if it's required to evolve into new versions in the future.

The **specific topics** that the game covers are the following:

- The periodic table: overview of how it's organized
- Groups (or families) of elements
- Names of th elements
- Symbols of the elements
- Atomic Number
- Atomic Mass
- Atomic Radius
- Valence
- Electronegativity

3.2- Mapping into a game

One of the biggest mistakes usually made when designing an applied game (I don't like the name 'serious' - a game can't be serious at all!) is a bad balance between the game itself an the knowledge transmitted. Too often serious games put that much interest and effort to 'teach' that they forget about what actually makes them be a game: the fun. To avoid this (big) problem, it's very important to map the knowledge and topics to transmit into game mechanics or elements so that they become fun.

3-The subject

Concept	Type	Reality	Game
Valence	Property	Combining power	Power to recruit an element
Atomic number	Property	Nº of protons in nucleus	Power to kill an element
Atomic radius	Property	Size	Power to kill an element
Electronegativity	Property	Attraction power	Power to steal an element
Element	Property	Type of element	Character
Family	Property	Group of elements	Family of characters
Alkali Metals	Family	Shiny, soft, highly reactive metals at standard temperature and pressure	Can be destroyed by using an 'H2O' card
Alkaline Earth Metals	Family	Silver-colored and soft, and have relatively low densities, melting points, and boiling points. Strong reaction to H2O	Can be destroyed by using an 'H2O' card
Lanthanides	Family	Rare elements	Bonus, extra mechanic to get extra reward
Actinides	Family	Rare elements. Easy disintegration, generating radioactivity	Bonus, extra mechanic to get extra reward
Metals	Family	Most common family	Can be destroyed by using a 'High Temperature' card
Non Metals	Family	Physically, nonmetals tend to be highly volatile (easily vaporised), have low elasticity, and are good insulators of heat and electricity.	Their characteristics aren't strong, so it's better not to give them a 'weakness'
Halogen	Family	Form acids when bonded to hydrogen. The halogens are also all toxic	Their characteristics aren't strong, so it's better not to give them a 'weakness'
Transition Metal	Family	Malleable. High density and boiling temperature	Their characteristics aren't strong, so it's better not to give them a 'weakness'
Metalloid	Family	In between or a mixture of those of metals and nonmetals	Can be destroyed by using a 'High Temperature' card
Noble Gas	Family	Inolors, incolor, pràcticament inerts i monoatòmics	Their characteristics aren't strong, so it's better not to give them a 'weakness'

4-Game Design

Once the goals and background that rule the project, it's time to start defining how the game actually is. At this point, the emphasis is going to be in how Traininglab uses fun as a key element to motivate its users (let's call them players!) to learn the knowledges we want to transmit.

4.1- Users as players

As said before, a key element in terms of turning Traininglab into an attractive product for the target group is precisely giving them what they expect, even if neither they know about it. Therefore, analyzing potential users through the lens of game design is a must.

First of all, we can consider the target group young people, probably **aged between 13 and 16 years old**. Due to the characteristics of this game and the background subject behind it, we can assume that most of our potential players are going to be teenagers within a **High School** Sciences Course.

From a psychological point of view, this target group has a **main goal: have fun**. One of the biggest problems in educating teenagers is their **constant need of activity and motivation**. Therefore, making lectures something attractive and specially engaging is a must if we want these students to give their best and trully learn what's expected.

The next step is to analyze our target consumers' needs in terms of motivation through the lens of **RAMP motivation profile**. According to this theoretical model about intrinsic motivation, our players can be attracted (and therefore motivated) by three patterns:

- **Relatedness**: the desire to be connected to others.
- **Autonomy**: the feeling of freedom.
- **Mastery**: the process of becoming skilled at something.

Finally, we can make a summary list of the main things that will motivate our players and therefore make the game useful and really meaningful:

- **Have fun**
- **Compete**
- **Socialize**
- **Learn** without being bored

**Student at
High School**

His goal is having fun.
He needs lectures to
be more attractive and
engaging in order to give
his best

**R
A
M
P**

HAVE FUN
COMPETE
SOCIALIZE
LEARN WITHOUT BE-
ING BORED

4-Game Design

4.2- Desired behaviours

Besides knowing what the potential users expect to get in order to be motivated, it's fundamental to have a clearly defined list of the behaviours we want them to have. If we have this list it's going to be easier to make sure that the game promotes the exact actions it has to. In Traininglab, the **desired behaviours** are the following:

- **Assimilate** the basic knowledges about Chemistry the game presents.
- **Play intensely.**
- **Percieve Chemistry as something engaging.** 'Fall in love' with it.
- **Share and discuss** with classmates.

4.3- Motivators

Traininglab consciently delivers the motivators its target group is expecting. Based on the '16 Basic Desires' motivational model by Steven Reiss, this board game gives a key role to the following:

- **Social Contact:** the desire for peer companionship.
- **Power:** the desire for influence or leadership.
- **Status:** the desire for respect based on social standing.
- **Independence:** the feeling of freedom.
- **Curiosity:** the desire for understanding.

If we analyze it through the lens of the '8 Kinds of Fun' theory by Mark LeBlanc, we can find seven of them. This is a good indicator in terms of making sure that the game doesn't lose the fun:

- **Fellowship:** game as social framework.
- **Challenge:** game as obstacle course.
- **Fantasy:** game as make-believe.
- **Sensation:** game as sense-pleasure.
- **Submission:** game as mindless pastime.
- **Discovery:** game as uncharted territory.
- **Narrative:** game as unfolding story.

4.4- Game mechanics

Game mechanics are the core element of a game. Commonly, they are even named as the 'verbs' or 'actions' that define it. That's why choosing the mechanics that rule a game is so important. In the case of a serious game, like Traininglab, they don't just have to mix well with the background knowledge. They have to exactly fulfill potential players' needs and motivational profiles.

4-Game Design

The following table shows the game mechanics included in Traininglab and the motivators to which they are related:

	Social Contact	Power	Status	Independence	Curiosity
Gain recognition					
Explore					
Be a hero					
Recognize patterns					
Gather knowledge					
Complete					
Listen to a story					
Triumph over conflict					
Master a skill					
Pretend to live in a magical place					
Be wise					
Compete					
Find treasures					
Collect					

4.5- Game elements

Once knowing the game mechanics that rule Traininglab, the next and last step in the game design process is defining the game elements that shape it. At this point is specially important to design a rich system that goes beyond the basic PBL (points, badges and leaderboards) elements. Therefore, Traininglab contains the following game elements:

- Achievements
- Points
- Challenges
- Fights
- Rewards
- Powers
- Inventory
- Random
- Life savers
- Avatars

5-Aesthetics

When designing a product that has to deliver a memorable experience it's fundamental to make sure that absolutely all the elements match perfectly. If there's a lack of coordination between one or more elements the experience is going to be broken and, therefore, the goals aren't going to be achieved.

In this chapter Aesthetics in Traininglab are going to be discussed and justified based on both some referents and the target group's consumption tendencies.

5.1- Referents

1 THE PERIODIC TABLE OF 18

18

1 2 13 14 15 16 17

1 2 3 4 5 6 7 8 9 10 11 12

13 14 15 16 17 18

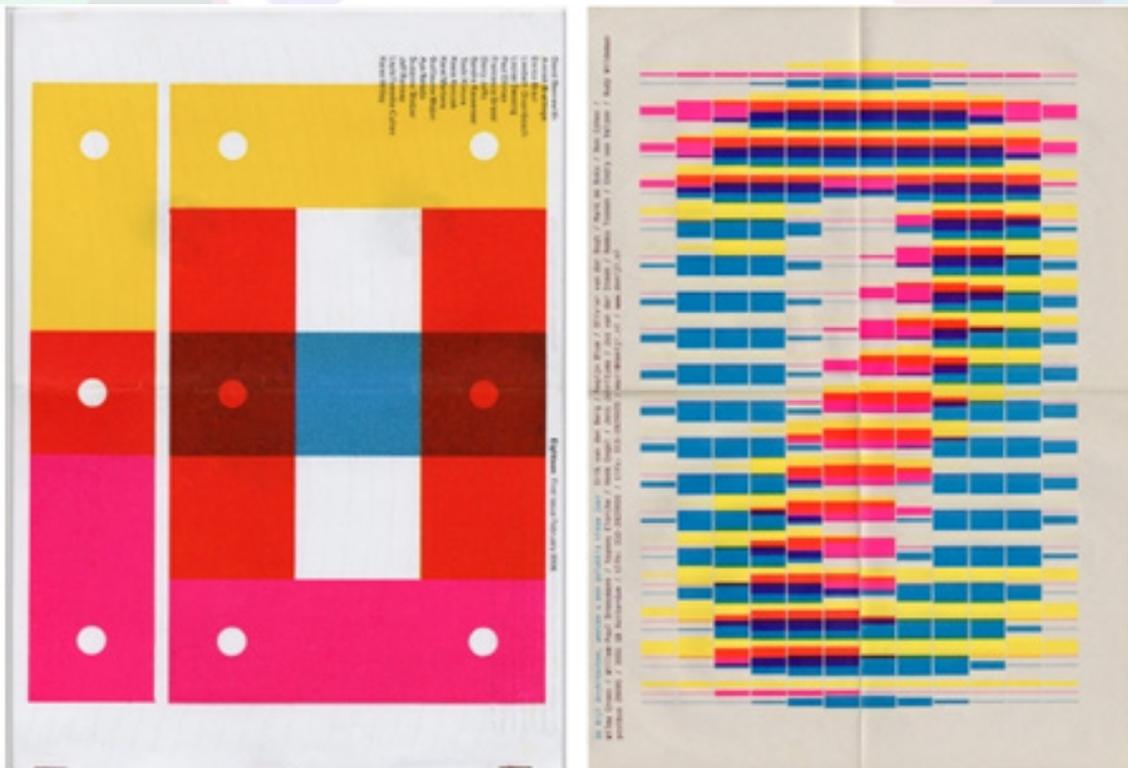
19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40

41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 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5-Aesthetics

Such a great job! But as it's going to be discussed when talking specifically about the design of the cards in the game, the option of creating an illustration for each of the chemical elements wasn't viable. One of the aims of this project is to be realistically designed in terms of production and costs, and the process of creating such a big amount of illustrations would have been too expensive.

Traininglab needs a simple but effective and attractive look. The second inspiring referent, the Dutch designer Karel Martens, goes in this direction. His works are simple, usually geometrical and colorful, which makes them clearly understandable and aesthetically powerful and attractive.



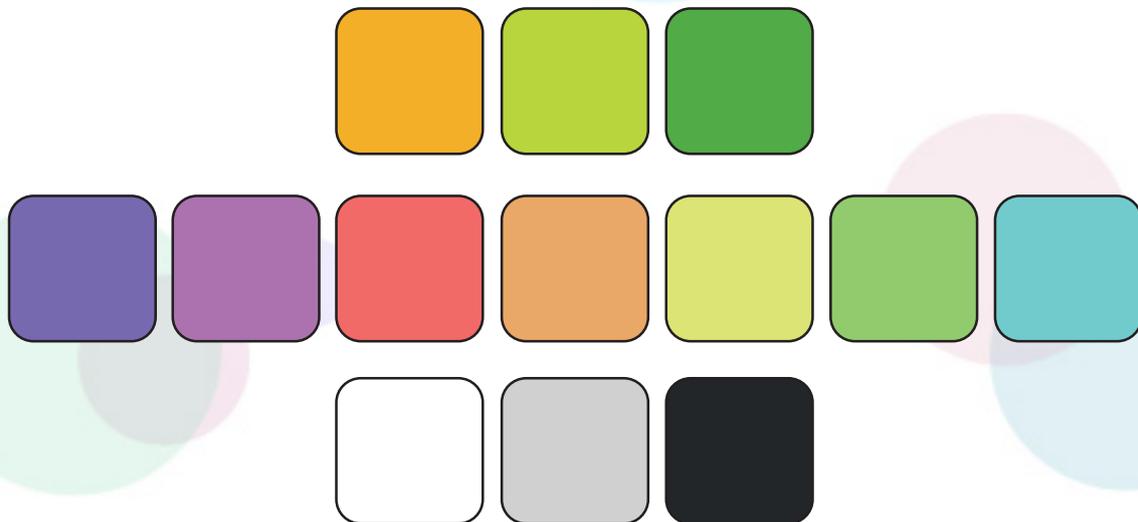
5.2- Branding

As said, Traininglab needs a simple but attractive aesthetic, specially due to the target group it's approaching. It has to be powerful and engaging but also simple to avoid overloading players and make them feel uncomfortable. Therefore, the main visual guidelines for this project are:

- A **bright and colorful** color palette
- Use of **geometrical** shapes
- **Simple** and not overloaded design

5-Aesthetics

Let's analyze the **color palette**.



First of all, it includes the main three colors that brand Traininglab. These colors are used for general applications, such as the visual identity or multiple package elements. Secondly, there's a range of colors representing the seven the chemical families of elements. These colors are exclusively used to represent these families in the board game. Finally, Traininglab uses a range of three grayscale color: broken white, middle grey and broken black.

The fonts used are **Zwodrei Bold** for the main text elements, due to its consistence, and **Bariol** for the text blocks, which is lighter. Both of them are simple but have enough personality to support a design based on them.

Zwodrei Bold

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

0123456789

Bariol

ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

0123456789

5-Aesthetics

The logotype is based on the first font, Zwodrei Bold, and the central color in the main triad of identity colors, although it has the black and white variations as well. It includes both the **name** of the board game (Traininglab) and a **slogan** (Chemistry and fun in one board game).

traininglab
CHEMISTRY AND FUN IN ONE BOARD GAME

traininglab
CHEMISTRY AND FUN IN ONE BOARD GAME

traininglab
CHEMISTRY AND FUN IN ONE BOARD GAME

5.3- Game materials

Based on these visual guidelines, several game materials are included in Traininglab. Let's see some samples of each one.

Package



top



bottom

5-Aesthetics

Booklet



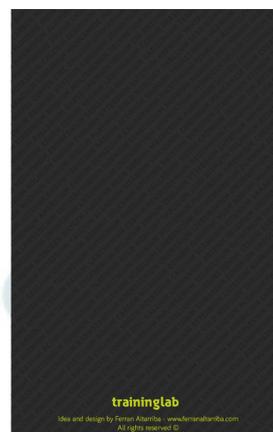
front



1

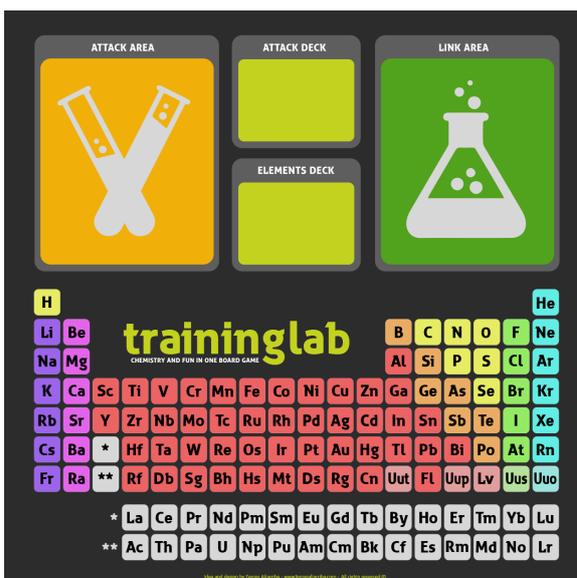


4



back

Board



It has two main parts: the **score zone** (lower half) and the **play zone** (upper half).

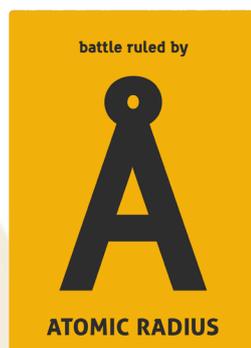
The score zone includes the periodic table where score is registered by adding shards. The play zone includes:

- **Attack Area**, where players fight
- **Link Area**, where new elements can be recruited
- **Attack Deck**, containing cards related to attack actions
- **Elements Deck**, containing the elements cards

Attack cards



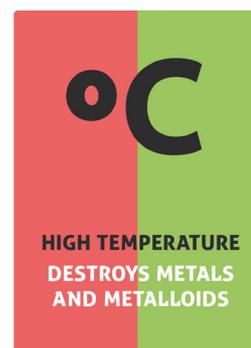
back



attack ruler



discovery card



superpower

5-Aesthetics

Elements cards



back

1 ± 1

H

Hydrogen

NON METAL

1	2	3	4	5	6	7
-1	-2	-3	-4	-5	-6	-7

Z | 1

\bar{A} | 0.79

X | 2.2

55 ± 1

Cs

Caesium

ALKALI METAL

1	2	3	4	5	6	7
-1	-2	-3	-4	-5	-6	-7

Z | 55

\bar{A} | 2.65

X | 0.79

105 5,4,3

Db

Dubnium

METAL

1	2	3	4	5	6	7
-1	-2	-3	-4	-5	-6	-7

Z | 105

\bar{A} | 1.39

X | 0*undefined

Players shards



Single player shards



back

45

Rh

Rhodium

65

Tb

Terbium

90

Th

Thorium

105

Db

Dubnium

116

Lu

Lutetium

6-Future steps

This project has been developed as a complementary part of 'The Revolution of Fun', my research in games and applied fun. After the production of the first prototype, several further processes need to be done in order to keep developing the game.

6.1- Refinement

Although Traininglab has been carefully designed following the information provided by the analysis of the target group and several motivational theories, only reality can show if it works properly. Therefore, once the first prototype is produced, the designing process continues by bringing it to High Schools and make teenagers play with it. This process is going to be shaped as a constant loop and it's going to last until the game works perfectly.

One of the things that need to be decided through testing is whether it's necessary or not to implement Transmedia elements (such as QR codes, AR elements, electronics...) into the board game. If test sessions show that Transmedia elements would improve the game and the outcomes it provides, their implementation would be a must.

6.2- Future versions

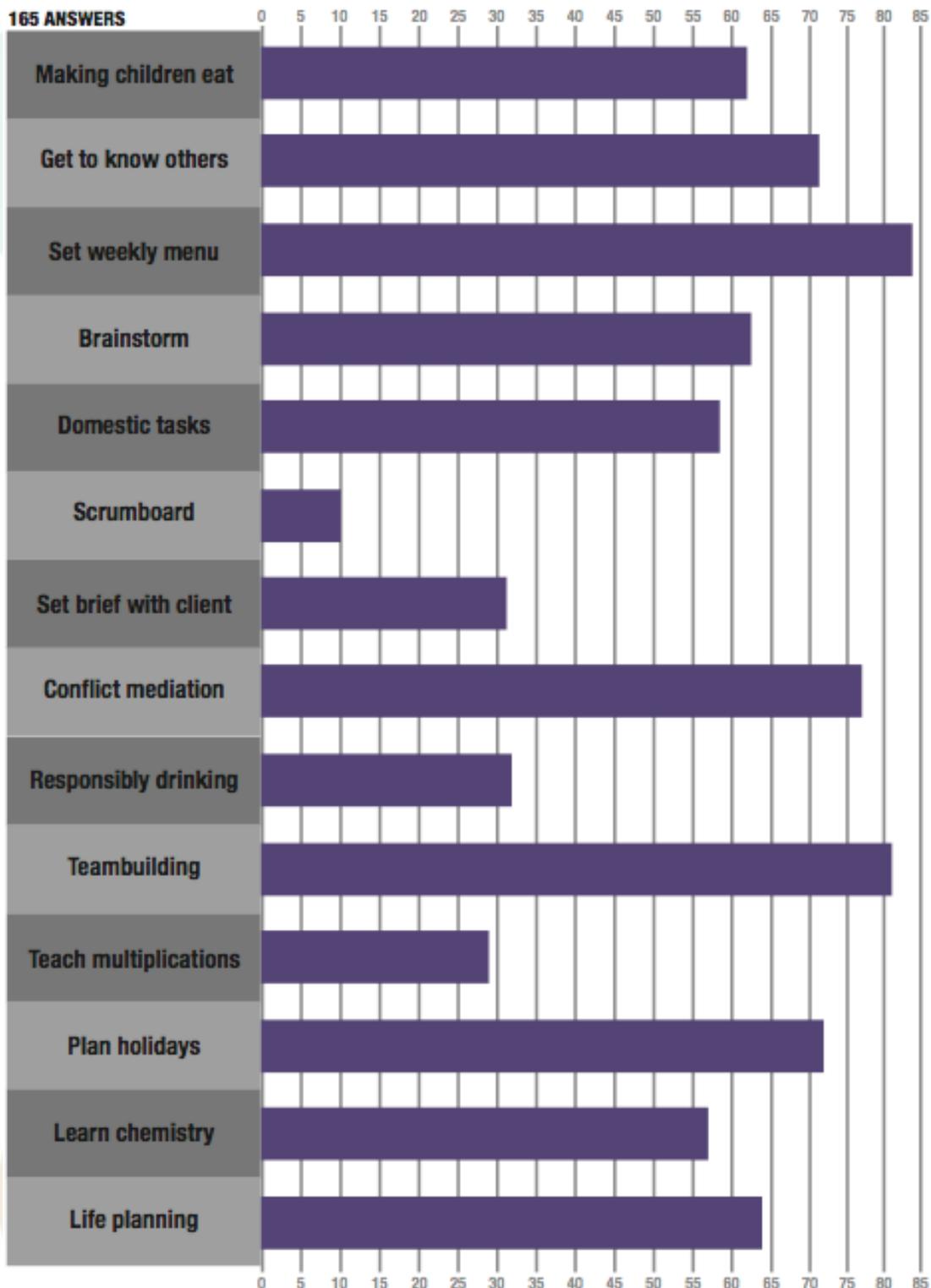
As discussed in the third chapter of this document, Traininglab has been designed to transmit the knowledges related to the basics of Chemistry. This means that it just covers the most basic and simple parts of this area.

However, the game has been designed to be adaptative to new hypothetical future versions or extensions covering more complex or specific areas of Chemistry. An example of this could be implementing a 'Combined Attack' game mechanic that allowed players to combine multiple elements when attacking. This mechanic would make them learn the combining rules for the elements.

Annex 1

Deciding the subject

As the initial idea for this project was to design an applied board game, the subject behind it wasn't clearly from the first moment. A list including different ideas was made, and it was presented in public so that people could show their preferences through a survey, as the following graph represents:



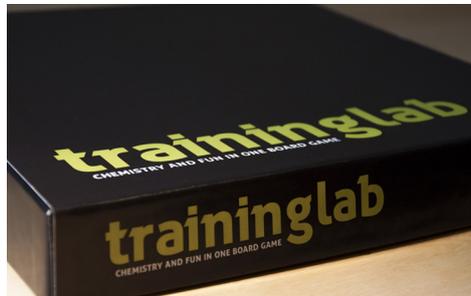
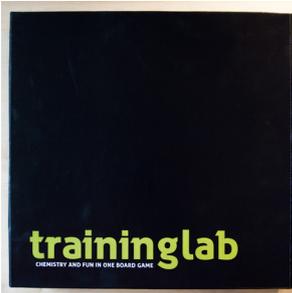
Annex 1 - Deciding the subject

165 answers were received within 48 hours, which gave a representative picture of the preferences a general target group had.

The final decision of choosing the basics of Chemistry as the subject behind the game was based on a few main facts:

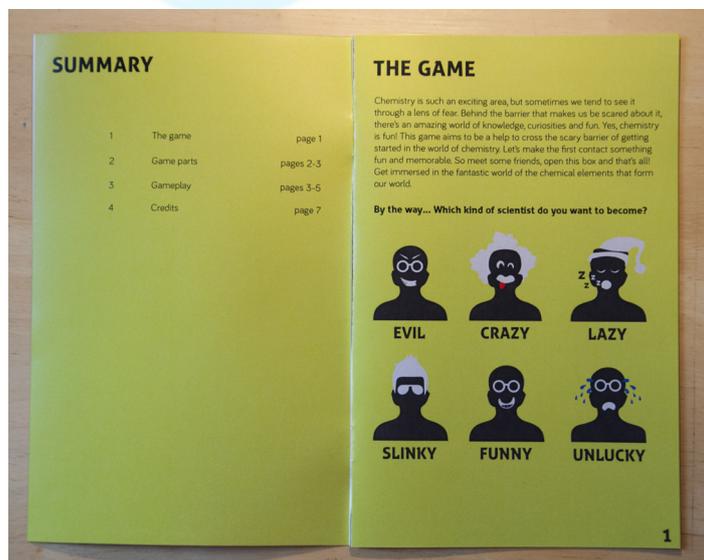
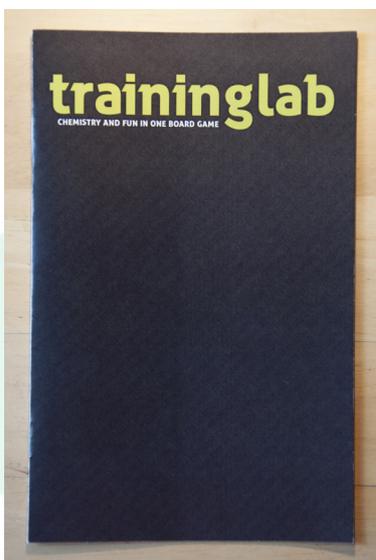
- Although it wasn't one of the most voted in the online survey, it had an acceptable amount of votes.
- The subject is specific and clearly delimited.
- Within a University context, it's easy to find experts in Chemistry if needed
- People showed a really impressive qualitative response in the surveys, they wrote several comments telling how they loved the idea.

Annex 2 The prototype



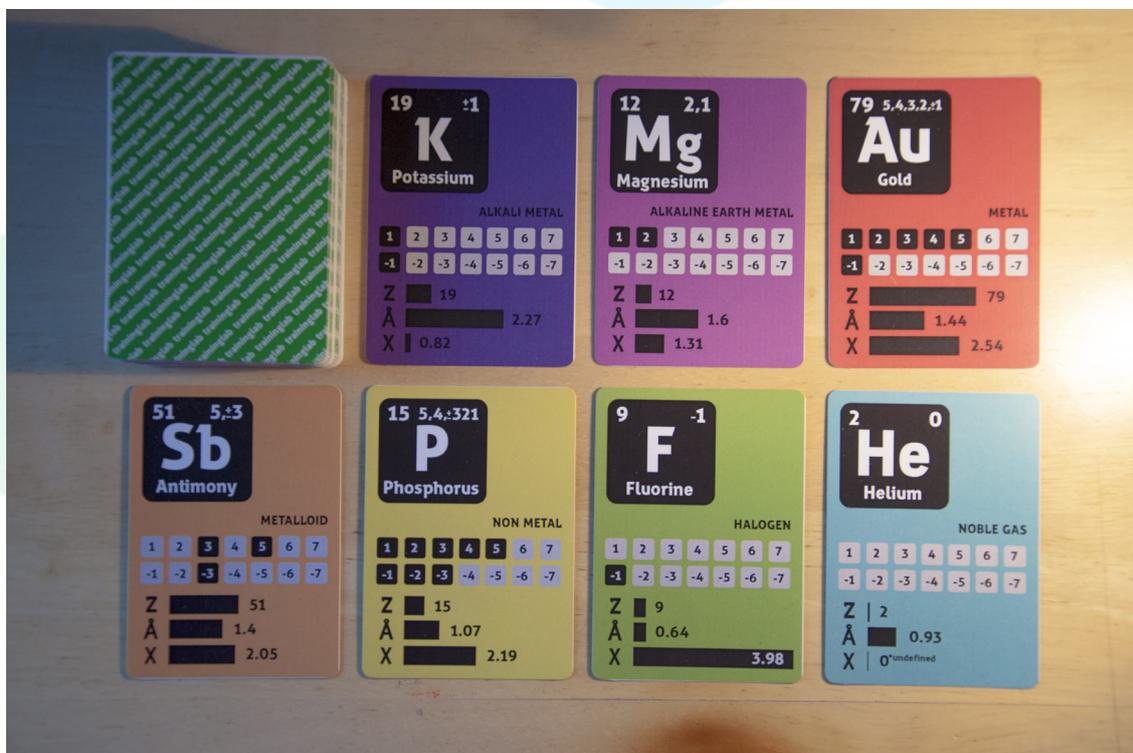
THE BOX

Annex 2 The prototype



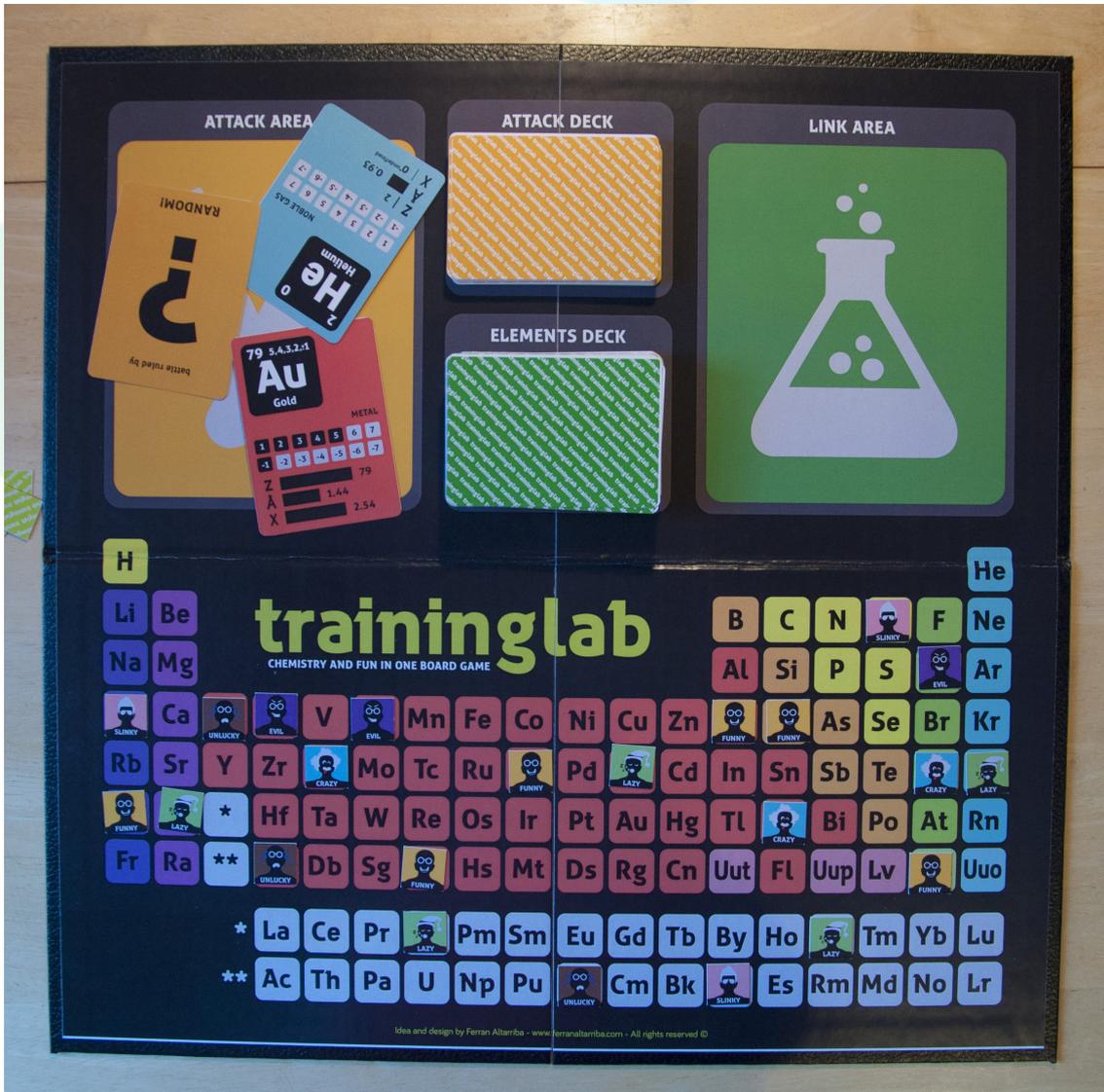
THE BOOKLET

Annex 2 The prototype



THE CARDS

Annex 2 The prototype



THE BOARD