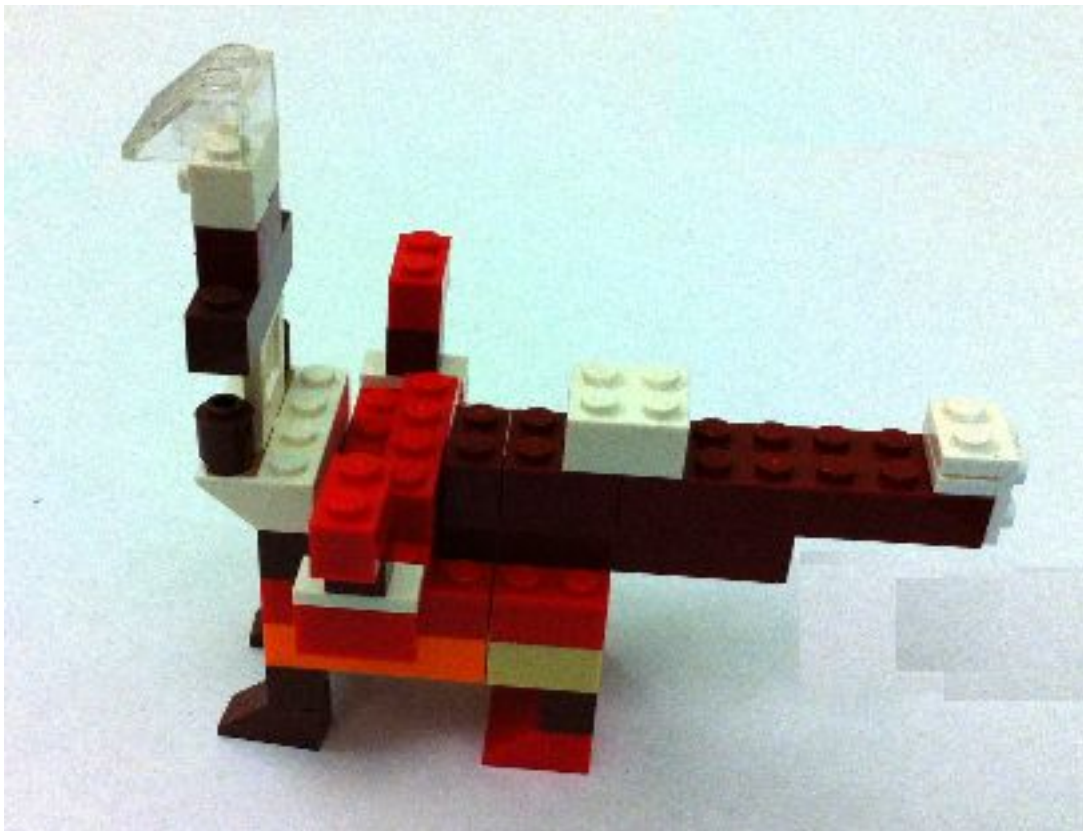


# Usability Report for the Magic Dragon

*By Toy Motif*



Authors: Hammad Zahid, Ravi Singh, Yordan Nikolov

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## 1. ABSTRACT

The sales at Toy Motif have been very low for the past few quarters. As a result, our company currently is on the verge of bankruptcy. To make our company competitive on the market, our team decided to design a user manual of a new toy called "The Magic Dragon". We expect that writing an easy-to-follow manual will help this product gain enough popularity to increase revenue for the company. We have designed the Magic Dragon for children 8 years old and above. We have adjusted the level of complexity of the language we wrote in the manual to meet the language skills of our 8 year old audiences. Using appropriate language will enable the targeted demographic to follow the step-by-step process without experiencing any major difficulties.

However, there were some limitations which affected the quality of the usability tests mentioned in this report. For the given time allowed our team had the opportunity to test the usability of the manual by asking only three volunteers to attempt to build the complete set. During test trials we recorded each user's performance, and we recorded their thought process as the users followed the think-aloud protocol (Glossary). For the quantitative analysis during our observations, we counted the number of wrong moves the users made while building each dragon "body" part.

Understanding how well the trial-test users were able to follow the written instructions accompanied earlier with step-by-step illustrations allowed us to make adequate changes in the body of the manual to increase its usability. Our testing highlighted our design mistakes and allowed us to understand what we can do differently in the next version. The original draft had a significant amount of confusing instructions, and poor image quality, as well as poor formatting style. Such flaws made the users slow down and not be able to complete the entire set by the end of the expected time period of about nine minutes.

Now that we have completed our analysis on how we could improve the users' performance and satisfaction we have provided our recommendation at the end of the report.

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### 4. GLOSSARY

**Think-aloud protocol** - According to the website Wikipedia a “think-aloud-protocol is a type of method which is used to gather data in usability testing for product design and development. Such approach is also used in the fields of psychology and a range of social sciences.

([https://en.wikipedia.org/wiki/Think\\_aloud\\_protocol](https://en.wikipedia.org/wiki/Think_aloud_protocol))

**Efficiency** - For the purpose of this report, the term efficiency is used as to measure how fast each of the users were able to complete the whole set.

**Effectiveness** - For the purpose of this report, the term effectiveness is used as to measure the degree to which the users successfully followed the step-by-step process.

**Satisfaction** - For the purpose of this report the term satisfaction is being used as to measure the lack of frustration felt by each of the volunteer due to poor instruction clarity.

## 5. EXECUTIVE SUMMARY

### 5.1. THE OBJECTIVES OF THIS REPORT

The design team at Toy Motif has prepared this report where they have recorded in detail their observations on the users’ experience during the trial tests of the user manual for The Magic Dragon - a toy made of building blocks. The report also provides a summary of the analysis done on the collected data, as well as the list of recommendations for the revision of the user manual.

### 5.2. USER-BASED APPROACH

We conducted three trials of our usability test by inviting three volunteers to participate in our study. The usability test was conducted by inviting three volunteer to participate in our study. Although our target age is as young as eight-year old, our volunteers ages varied between early twenties and late thirties. We were restricted to this audience because it would be cumbersome to get the required approval from the University to conduct studies on 8 year olds. o analyse the manual’s usability, we recorded the users’ think-aloud cognitive process. Additionally we required that each of the participants complete an exit survey at the end of their trial. The main criteria used to evaluate the quality of the manual were as follows: (1) The effectiveness of the step-by-step instructions (2) The respective time efficiency (3) The level of satisfaction of each of the three users. To assess the performance of each user, we used the following evaluation data: (a) Time elapsed during the completion of each of the “body” parts of The Magic Dragon (b) User’s comments; (c) User’s moves (d) Number of errors made for the completion of each “body” part (e) User’s recommendations and (f) Level of satisfaction as users indicated in the survey. The users were instructed to follow the think-aloud protocol. In that way we could better understand where each of the users was experiencing difficulties following the instructions and the illustrations for each of the “body” parts.

### 5.3. RESULTS AND REVISIONS

It was apparent that each of the three volunteers had difficulties completing the assembly within the expected time limit of about nine minutes. All participants were stopped in the middle of their assembly process after giving them on average ten minutes to build the dragon. At the end of the ten-minute period all participants were still trying to complete the “Tail” body part.

Users had a common difficulty of figuring out how to put together the white blocks at the tip of the tail (see STEP 2 in PART 2 for completing the “Tail”). According to their experiences, all users had difficulties understanding the written instructions and the illustrations associated with this stage of the assembling process. As a result, we revised the quality of the illustrations and we reduced the amount of text instructions. Also the names of some of the pieces were modified as the users were not able to understand what the described pieces looked like.

### 5.4. LIST OF USERS’ RECOMMENDATIONS

#### 5.4.1. Claire

- Clearer pictures would be nice so if users do not know the building block name they could see in detail which building block is used in the visual.
- Would be clearer if images that were relevant were closer together.
- Use a better balance of images and text. Images need to be improved

#### 5.4.2. Clayton

- I was frustrated with the majority of this manual.
- I like the idea of building a magical dragon.
- Not going to remember the size of blocks and how they work
- Too much text description, used images to figure out
- Can’t determine how to connect pieces, on top or bottom
- Show pictures of the final product to show how it is completed.
- Have pictures of all pieces that are needed.
- Prefer to have all steps on the same page.
- Pictures aren’t very clear. Don’t use low-res pictures
- Label pieces more clearly.

#### 5.4.3. Monica

- Use clearer images and text.
- Clarify what 1x1 blocks are (either by bumps or connectors)
- Don’t use brick red as a color

## 6. INTRODUCTION

### 6.1. ABOUT THE PROJECT

This report was written by the design team at Toy Motif. The team's goal was to design a user manual for assembling The Magic Dragon from building blocks. Our main focus when writing the user manual was to maintain a level of difficulty that is appropriate for children eight years old and above, who would be able to follow the instruction without experiencing major difficulties. The average user is expected to complete the whole assembly of the dragon in roughly nine minutes. To achieve such results, appropriate word choice accompanied by concise step-by-step illustrations were used. The Magic Dragon instructions were divided into sections. Each section walks the user through the assembly of one of the body parts of the Magic Dragon. There are five sections; Front Legs; Back Legs; Face; Tail; Wings; At the end the user is being instructed to assemble all body parts in one. There are a total of 38 building blocks required to build the Magic Dragon.

### 6. ABOUT THE VOLUNTEER USERS AND THE TEST APPROACH

The user manual was tested by three volunteers. Analysing the volunteers' experiences helped our team improve the organization of the overall manual and how each step is explained. The users' performance was observed so that we could:

- Document the volunteers difficulties at each step
- Assess the level of learnability based on the users' efficiency in following through the instructions
- Gauge the users' satisfaction level

To better understand the users' experiences when building the dragon set, our team asked the volunteers to think aloud. At the end of each test, each user was asked to complete an exit survey. The survey allowed the volunteer's to rate different aspects of their experience while using the manual (see "EXIT SURVEY RESULTS" in [section 8](#)).

After taking under consideration the users' experiences and advice we, recommended that the text instructions accompanying each steps needed to be reduced. Additionally, our team concluded that the quality of our illustrations were poor and the isometric perspective on some of the illustrations was not at the most optimal angle; therefore we created a whole new set of images. Also, we recommended that some of the names of the figures should be changed as they were confusing to all users.

The report includes the methods used for testing the usability of the instruction manual as well as the changes our team decided to make after analysing the results from the users' experiences. Finally, after making our recommendations, we made the respective changes and

also created an electronic version of the of the manual by publishing the instructions in the form of a PowerPoint.

## 7. METHOD

The team evaluated the level of usability of the user manual based off three criteria: instruction effectiveness; construction time efficiency; and users' satisfaction. We were able to implement the following methods: counting the number of wrong moves made by each of the users while completing each step on our observation sheet; recording the users' cognitive process after instructing them to follow the think-aloud protocol; receiving a more detailed feedback in the form of an exit survey.

### 7.1 THE REVISION PROCESS

We asked three volunteers to attempt to build the Magic Dragon using our instruction manual. Based on their performance and personal experience, we were able to evaluate the effectiveness, efficiency, and user satisfaction for the first version of our instruction manual. During the three trials we asked our participants to think aloud while building the Magic Dragon. Their thought process was audio recorded while we made observations on how they completed each step and if they conducted any errors. At the end of each test, the respective participants filled out an exit survey to additionally quantify their level of satisfaction based on how comprehensive the first version of the manual was.

#### 7.1.1 DEFINITIONS

- **Think-aloud protocol** - According to the website Wikipedia a "think-aloud-protocol is a type of method which is used to gather data in usability testing for product design and development". During this protocol, the user speaks aloud as they are going through the design test so that the observers can understand their cognitive processes.
- **Efficiency** - For the purpose of this report, the term efficiency is used as to measure how fast each of the users were able to complete the whole set.
- **Effectiveness** - For the purpose of this report, the term effectiveness is used as to measure the degree to which the users successfully followed the step-by-step process.
- **Satisfaction** - For the purpose of this report the term satisfaction is being used as to measure the lack of frustration felt by each of the volunteer due to poor instruction clarity.



## 7.2. CUSTOMER DEMOGRAPHICS

The target audience for this product are children of age of eight years or older. After taking their young age into consideration, our team decided to keep the number of building blocks reasonable (38) and we tried to use appropriate terminology to avoid replacing the feel of excitement by unwanted frustration.

## 7.3 TRIAL USER PROFILES

Although our new toy is targeted towards eight-year-olds, our test users are much older. Monica and Claire are in their early twenties and they are currently obtaining their Bachelors degrees at the University of California Davis (UCD). Clayton was our third participant. He is his early thirties, and he is one of the University Writing Program Lecturers at UCD. Although our volunteers' logical thinking is much more advanced than of eight year old children, it was still beneficial to us to see how individuals, who have never seen The Magic Dragon being built, perform at each step.

## 8. RESULTS

This section summarizes our analysis on the data collected from the survey questionnaires and the observations sheets. In this section we describe the thought process and level of performance of each of the participants while building the Magic Dragon. These results highlight the quantitative and qualitative data that we collected during the test trials. We were interested in analysing the following indicators of level of performance and personal satisfaction:

- User comments
- Physical observations
- Number of made errors
- Users' recommendations
- Time efficiency for the completion of each task.

### 8.1. COGNITIVE WALKTHROUGH WITH THINK-ALOUD PROTOCOL

#### 8.1.1 CLAIRE

The first user was Claire. Claire did not meet the goal of finishing the entire dragon set in under 10 minutes. While building the front legs she was not able to meet the goal of completing the step in 15 seconds with no errors. Claire did not make any mistakes but she took 30 seconds to build the front legs. She didn't really talk about her thought process, however this could be due to the fact that this step is relatively simple. However, she was reading the instruction manual longer than needed for this step.

The goal for building the back legs was to complete the step in 30 seconds with 0 errors. Again Claire did not make any errors in this step but she took 1 minute and 20 seconds building the back legs. For this step she held the instruction manual in her hands, looking at the images of the steps, while building. She seemed confused by the wording of the steps and when looking at one of the pictures she did not know what the tan piece looked like. She still found it but she said “ I guess this is tan. I’m not sure.” When the back legs were built she commented that “ I think these are back legs but I can’t really tell.” So even if she followed the right steps she could not tell the piece was completed from the images.

The goal for building the wings was to complete the step in 60 seconds and make 0 errors. Claire still was not able to meet the time, clocking in at 3 minutes, even when making no errors. Unlike the previous two steps, she gathered all the necessary pieces before building. She initially could not find a building block piece we described as “arched” but when she found it she recommended we should not name that piece an “arched piece.” With every step she starts to become more hesitant when building as she is trying to decipher what the manual wants her to do.

The goal for building the Tail was to complete it in 60 seconds and make no errors. Claire failed this step by making an error and not completing the step at all. For this step she did not gather the pieces beforehand. At first she was confused for why on one page it had the materials needed for the piece and the actual steps on the next page. She noted an error in our description of a piece which we described as “2x4” when in our description of what the pieces are it should have been a “2x6.” While building the tail she was confused as what we described as a “corner white piece” was. She flipped through the pages trying to see if it was somewhere noted in the manual and ended up picking up a wrong piece and placing it instead. In the end she did find the actual piece and place it but the time limit ran out. She recommended that we make our images clearer and have the steps and material pieces placed together in the manual.

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### 8.1.2 CLAYTON

The second user was Lecturer Clayton Benjamin. Clayton did not meet the goal of finishing the robot dragon in under 10 minutes. For the first step building he did not meet the goal of completing the step in 15 seconds with 0 errors since he took 1 minute and 4 seconds to complete the step. Clayton made no errors but when he was reading the steps out loud he said that there was “too much text” needed for the step. He constructed the back legs, this time unlike the other trials doing bottom to top rather than the other way around. He noted that he mostly used the pictures provided in order to complete the step.

The goal for building the back legs was to complete the step in 30 seconds with 0 errors.

Clayton did not make any errors in this step but he took 1 minute and 20 seconds building the back legs. Clayton was able to go through the step with relative ease by looking at the pictures but he noted that we should have included pictures depict a top to bottom process of building the piece rather than bottom to top. He also recommended that we should include a picture in this step depicting the what the back legs should look like after being built.

The goal for building the wings was to complete the step in 60 seconds and make 0 errors. Monica was not able to meet the goal. She completed the step in 3 minute and 34 seconds and made an error. Clayton was confused as to why the picture showing the steps was not with the actual instructions for this step and recommended that we should put them all on one page. In addition, he said the picture was not clear in showing all the pieces needed and that we should have pictures of the individual pieces needed. Clayton still used the pictures with the instructions to build the wing in relative ease until he could not determine which white pieces were needed and picked up the wrong white pieces. The white pieces he placed on the wings were actually needed for a later step and would confuse him later on. However, he was able to figure out those were the wrong pieces and found the right ones. He emphasized that the pictures should be clearer.

The goal for building the Tail was to complete it in 60 seconds and make no errors. However, time ran out in the test for Clayton to achieve this goal. When he initially looked at the steps he noted that there was “a lot of verbiage” and that we should include higher resolution pictures. When building this step he connected two pieces in the wrong placements but he could not tell he made a mistake when looking at the pictures. He also used the wrong white pieces for this step as well and these white pieces are crucial for a later piece. However, time ran out before he could figure out his mistake or complete the tail.

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### 8.1.3 MONICA

The third user was Monica. Monica did not meet the goal of finishing the robot dragon in under 10 minutes. While building the front legs she was not able to meet the goal of completing the step in 15 seconds with no errors. Monica did not make any mistakes but she took 40 seconds to build the front legs. She made no errors during the step and noted that the “pictures made it more clear than th words” referring to the fact the images helped her through the step rather than the instructions. In addition she noted that the step would be confusing if there were no pictures. Monica said the instructions did not note how to place each piece i.e. should she have place the angled pieces under the long piece or should the long piece be placed on top of the angled pieces.

The goal for building the back legs was to complete the step in 30 seconds with 0 errors. Monica did not make any errors in this step but she took 50 seconds building the back legs. For this step she took time looking at the pictures and trying to retrieve the relevant building blocks

before building. She took some time trying to find one of the angled pieces and for finding the tan piece. Otherwise she went through the step relatively easily.

The goal for building the wings was to complete the step in 60 seconds and make 0 errors. Monica still was not able to meet the goal by only completing the step in 1 minute and 30 seconds and making an error. She noted that, unlike the previous two steps, there was a big jump in difficulty and when skimming the instructions, reading out loud, she felt the step was more confusing. When building the wings she picked up the wrong white pieces for this step and instead placed pieces needed for a later step. She was also confused what piece was as we described as a “round brown piece” but still found it. When she built the wings she used the final picture on the instruction manual to see if she did it correctly.

The goal for building the Tail was to complete it in 60 seconds and make no errors. However, time ran out in the test for Monica to achieve this goal. When looking at the instruction manual she noted that the naming a color of a piece as “brick-red” was confusing since building blocks from similar toy sets are sometimes referred to as bricks. Thus she recommended that we not use that naming convention. Like the past tw test she was confused with what the white “corner piece” was for this step and took time trying to find it until time ran out.

**PLEASE PROCEED TO NEXT PAGE**

TABLE 1: OBSERVATION OF USERS

User	Efficiency	Effectiveness	Satisfaction
Claire	Took longer than expected. Incomplete. Stopped at 10:00 min while building tail.	No problems with Front legs Base - easy Separates pieces ahead of time Looks at pictures Figured out which block even though mistake in instructions Taking time to start wings Picks up pieces then puts back down - doubt	"I will assemble the first legs first" "I guess this is tan" White corner pieces unclear "2x6" written wrong. Maroon Blocks Pictures need more clarity Thinks legs are backwards or unsure of build. "Arch" First looking at image then builds Confused by pisces color Corner White piece confusing
Clayton	Took longer than expected. Struggled with Tail, stopped at 9:50	Reads out loud. Too much text Separates pieces "Do top to bottom rather than bottom to top" Used pictures more than text Wings error: 1-2 flat instead of blocks Tail: "Connected 2x6 initially. Doesn't look at other pieces	"Take brown and put on top" "'1x1' confusing, but I guess?" Confused between relationship between base and wings Confused and stressed Corner piece confusing Flat vs block 1x1 unclear "Put number on pics, remove pic on page 8" "Strange to have sections on multiple pages"
Monica	Took longer than expected. Building tail at 7 minutes, time for class ran out.	Separates pieces required for step and then builds Confused at tail building step. Did not complete structure Page 6 confusing Big jump in difficulty with wings Top to bottom relationship confusing	Steps with clear pictures were easier to follow Confusion without pictures Hesitation at times "Oh this is tan" "Looks complicated" Problem with distinguishing some colors

TABLE 2: TEST RESULTS FOR USER EFFICIENCY - GOAL TIME VS. ACTUALS

Steps	Goal Time	Claire	Clayton	Monica
1	15 secs	30 secs	1 min 4 sec	40 secs
2	30 secs	1 min 20 secs	1 min 21 sec	50 secs
3	60 secs	3 min 10 secs	3 min 25 sec	3 min 30 sec
4	60 secs	5 min	4 min	2 min
5	90 secs	Incomplete	Incomplete	Incomplete
6	20 secs	Incomplete	Incomplete	Incomplete
7	2 min	Incomplete	Incomplete	Incomplete

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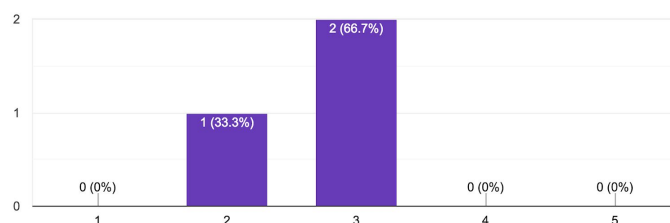
## 8.4 EXIT SURVEY RESULTS

To understand the efficiency we will look at the survey each user filled out after their testing period. Some of the most relevant results are listed below.

**(Figure 1)** Each of the participants experienced noticeable difficulties completing at least one or two steps during the procedure. Three of the most common steps were finding the 2x8 brick red piece as it was mislabeled as 2x6 red brick. The second was clipping the white 1x2 angular piece at the back of the tail. The third common obstacle for each of the volunteers was defining the (white flat 1x2 on one side and 1x1 on the other side) piece, as the particular.

This manual helped me achieve every step

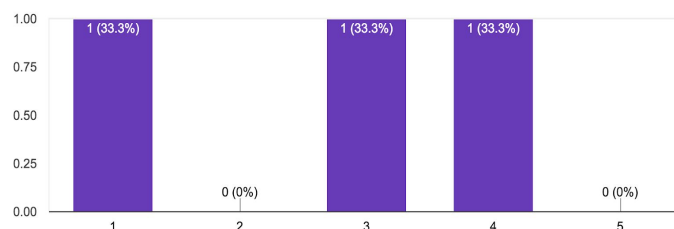
3 responses



**(Figure 2)** Two out of three of the users was felt that our manual design was visually appealing. This could indicate that embolding the steps in the manual when referring to a specific piece is beneficial. It can also indicate that our placement of the pictures were appealing as well.

This manual was visually appealing

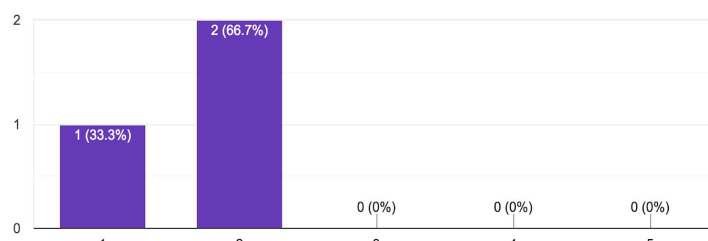
3 responses



**(Figure 3)** All of our users indicated that the written content in the manual will not appeal to a 8-year old. This is important since they are our main target audience. This could indicate that our instructions were too complicated and must be simplified if we want an 8-year old to interact with the document.

This manual was written to appeal to a 8-Year Old

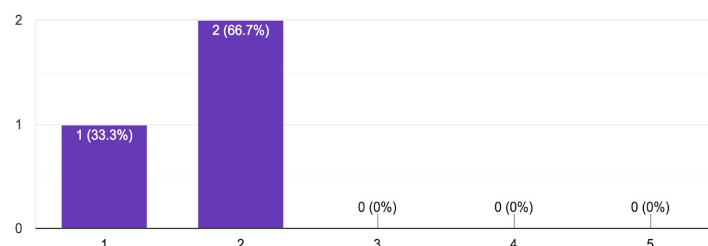
3 responses



**(Figure 4)** One last thing to note is that all of our users felt that they were not able to competently build the dragon. Even during the steps they completed, they felt that they were not building the pieces in the right way. Although in most cases they were building them in the right way. This probably means we need our instructions to be more clear.

Where you able to competently build the dragon?

3 responses





## 9. DISCUSSION

While conducting the usability test, there seemed to be consensus between all users about which sections were most confusing: picture quality, confusing instructions, and confusing naming for the pieces made it difficult for users to follow.

### 9.1 RECOMMENDATION 1

#### USE HIGHER QUALITY PHOTOS

The first recommendation that we received from all users was: "The picture quality of some of the images is bad." The reason the images were low resolution was because the team member in charge of taking pictures of the building blocks had an old model of the Iphone. The poor image quality affected the manual since the users could not tell what some of the smaller pieces were, since the pieces seemed to be indistinguishable from one another. This negativity impacted the user's time efficiency and effectiveness in regard to going through each step. If we were to start selling The Magic Dragon with the manual the way it was written, the users would have to try and figure out what the building blocks depicted. If the user accidentally picked the wrong pieces it would cause additional confusion in the process.

To resolve the issue of low picture resolution, we took new pictures of the pieces from a member who had a relatively new smartphone. We also tried to photograph the pieces at an angle where the user can clearly see what building block they need. Since the new images are of better picture quality and clearer, they enhance the clarity of each step more than the original pictures.

### 9.2 RECOMMENDATION 2

#### SIMPLIFY THE INSTRUCTIONS

The second recommendation users provided us was to simplify our instructions. When reading through the manual all of our test users commented that the actual written instructions were hard to follow since they were badly worded or too complex. In order to complete the steps, they heavily relied on looking at the images for details on how to do each step. The difficulty to understand the written instructions can hinder potential users since it would take more time than the necessary time to complete each step. Most of our test users spent a lot of time reading and trying to decipher the manual. The time taken to read the manual can negatively impact the user's efficiency since they are taking a long time to read the instructions before abandoning them and use the images instead. The time efficiency would have been worse if we actually had asked eight-year-old children to perform the test.

To resolve this issue we went back to the instructions and cut back at a lot of complex sentences. We made sure the only instructions left were actions such as “place x on y” instead of having details added onto those instructions such as “place x on y such that a and b.” We also tried to make sure these instructions were concise by having a goal of just one sentence for each instruction. This will hopefully make instructions more simpler and allow users to get through them relatively fast and then go on to pictures.

### 9.3 RECOMMENDATION 3

#### BE CLEAR ABOUT WHICH PIECES ARE NEEDED FOR EACH STEP

The third recommendation that we received was to make sure to be clear on what pieces were needed for each particular dragon “body” part. Many of our steps included a list describing the individual pieces needed to build a part. However, there were unordinary building blocks that we named in a way that confused the users. They were confused about what a “corner” or “arched” piece was. And since there were no images of the individual pieces the users had to look at the pictures detailing the steps to see what pieces were used. Added onto the fact that the pictures were not of good quality, this affected their time efficiency and flow-through effectiveness. Since the users lost significant amount of time in looking for the building blocks they needed, none of them was able to complete the set after trying for entire 10 minutes.

To resolve this issue we decided to include images of the individual pieces that were used to build the dragon. We then added relevant building-block images to the material list. This is beneficial since before a user reads the steps to building the part they will know what pieces they should have based on the images.

## Appendix

### 1.1 The Magic Dragon - First Draft of the Manual

<https://docs.google.com/document/d/16bhWrf5vBBetMh0CKUI1dIMZltqqULldfn0zMTVlrKg/edit>

### 1.2 The Magic Dragon - Revised Version of the Manual

<https://docs.google.com/document/d/16bhWrf5vBBetMh0CKUI1dIMZltqqULldfn0zMTVlrKg/edit>

### 1.3 The Magic Dragon - PowerPoint Version of the Manual

[https://docs.google.com/presentation/d/1E3e2p76gRTNfbGR9woGYc0tKNA9yHVZDmcouRtS-xDI/edit#slide=id.gc6f80d1ff\\_0\\_0](https://docs.google.com/presentation/d/1E3e2p76gRTNfbGR9woGYc0tKNA9yHVZDmcouRtS-xDI/edit#slide=id.gc6f80d1ff_0_0)

### 1.4 The Magic Dragon - MEMO

<https://docs.google.com/document/d/1GNKPYYU7xXSnmK1xWoYe9mvktYnHRQ-z-2UIKEp0MM/edit?ts=5be6560b#heading=h.mqta986ovt1b>