

# Designing a student dorm wayfinding sign system

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## Abstract

Public places like student dorms consist of many sections positioned on different locations of the dormitory complex. Wayfinding signage based on pictograms can be a useful tool for navigating visitors through the dorm area. In this paper, three sets of wayfinding pictograms are designed and tested. The sets consisted of twelve pictograms for indoor and outdoor signage. They were evaluated by the student population who rated the guessability of the signs and provided the explanation for their ratings. Three the worst-rated pictograms were redesigned according to participants' responses and generated better effects on the target audience. The results demonstrate the effectiveness of testing wayfinding signs during the early design stages and stress the importance of the communication between designers and users.

**Keywords:** pictogram, signage, wayfinding, dorm, student

## 1. Introduction

Pictograms represent concepts in a form of pictures which are used as a substitute for written messages and instructions. They can express regulatory, mandatory, warning and prohibitive information. The main characteristics of pictograms are understandability, fast information processing and noticeability. This paper analyses the informative pictograms which are intended for use in public space. They consist of a graphic symbol and a referent. In order to achieve high detectability and comprehensibility, the structure of these pictograms is simple and clear.

According to Wogalter et al. [1], the pictograms should be evaluated in two ways. The first is a formative evaluation which occurs while the signs are being designed. The advantage of formative evaluation is the possibility of making improvements in pictogram design before its implementation in the real world. Another type of testing is summative evaluation which occurs in the real environment, when the final design of pictograms has been finished. Although this type of evaluation has many benefits, the main issue are extra costs associated with design corrections. These

changes may have been far more cost-effective to make during the early design stages.

Testing pictograms is highly important in the pharmacy industry where drug packaging conveys information about drug use, indications, precautions and side effects [2], especially because previous research indicated that pictogram comprehension can be affected by the level of education [3]. Many previous studies have shown that the comprehension of pictograms on other types of products should also be tested. For example, Easterby et al. [4] demonstrated that the attributes of signs themselves and the attributes of users can be the factors that may influence the comprehension of the signs on potentially dangerous household products. Davies et al. [5] investigated toy safety pictogram and various pictograms related to consumer products. They have found that the comprehension of the pictograms was poor, which indicates the need for stringent testing procedures.

Previous studies have also demonstrated the importance of pictogram testing in the case of wayfinding. Lee et al. [6] tested symbols for wayfinding in healthcare facilities and found that some symbols can be interpreted

differently across the cultures. Similar findings were reported by Sunyavivat et al. [7] who found that pictograms for hospital signage might not be understood correctly by all groups of visitors.

Pictogram should convey information without accompanying textual explanation. Unlike warning labels, wayfinding signs are not strictly standardized. However, it is recommended to design them in order to achieve good visibility in the environment and high level of noticeability [1]. In this paper, we investigated new design solutions for a student dorm wayfinding sign system. The aim of proposed set of pictogram is to facilitate the movement of visitors through the dorm area (indoors and outdoors).

## 2. Design of the proposed pictograms

The paper analyzed design solutions for the set of 12 pictograms (8 for outdoor and 4 for indoor application) which purpose is to aid visitors to orientate themselves in dorm area. Outdoor set of pictograms included signage for pastry shop, library, infirmary, gym, cash office, cinema, administration office and laundry. Indoor set of pictograms included signage for shower room, dorm rooms, kitchen and reading room.

The choice of motives for each of the pictogram is explained as follows. The pastry shop was depicted by a cupcake which was a simple form that fits well into the circular frame.

The library was presented by three books on a bookshelf. The gym was illustrated by simple form of an exercise weight. The cinema was depicted by curtains which was considered as the most dominant motive of the cinema room. For the cash office, banknotes with symbol of euro were used as motives. The infirmary was indicated by injection and a cross which is well-known symbol for the first aid. The administration office was presented by the combination of two motives: a desk and an authoritative person. The laundry was indicated by a washing machine. For the shower room, depiction of a shower with jets was used. The kitchen was illustrated by a dish on a hotplate of stove. The pictogram for the dorm rooms presented simplified form of a sleeper in a bed. Finally, the reading room was depicted by silhouette of a person with an opened book.

In the process of designing the formal characteristics of the sign system, we used three different design approaches. The first set of pictogram was based on lines. The second set was based on planes. The third set was the same as the previous one, but inverted. All of the pictograms were framed by a circle.

Figure 1 shows the first set of pictograms. The line of the pictograms was unformed through the whole set, with the weight of 2 pt. The weight of line of the frames was 4 pt. The design of a set was guided by the principle of uniformity. In order to avoid ambiguity, we used simple forms with recognizable objects.

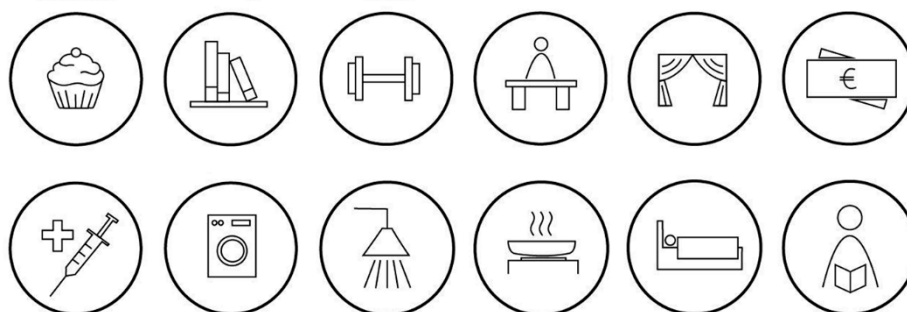


Figure 1. Set of pictograms based on lines

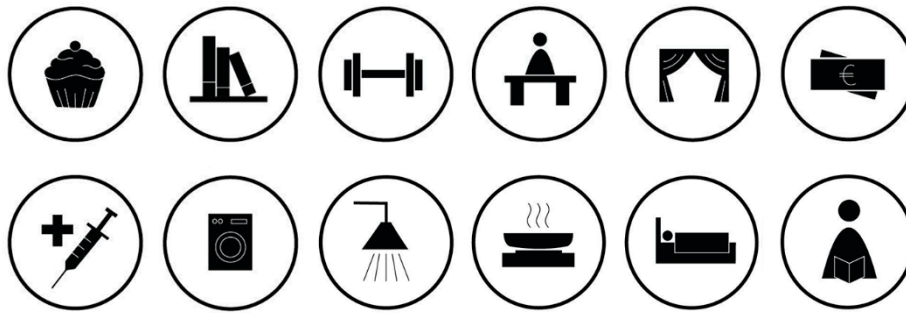


Figure 2. Set of pictograms based on planes

Figure 2 shows the second set of pictograms. This system used the same motives as the previous one. Unlike the first set, where motives were presented by lines, this set used plane as dominant form. Lines were used only for inner elements on the motives (such as details on the cupcake or the washing machine), and their weight was 1 pt. In comparison with linear design of the first set, this set of pictograms is

perceived as “heavier” because the black planes take up more area on the pictogram’s surface than lines.

The third set of pictograms is shown on Figure 3. This set was designed as inverted version of the second set. In line with that, the pictograms consisted of white motives on dark background.

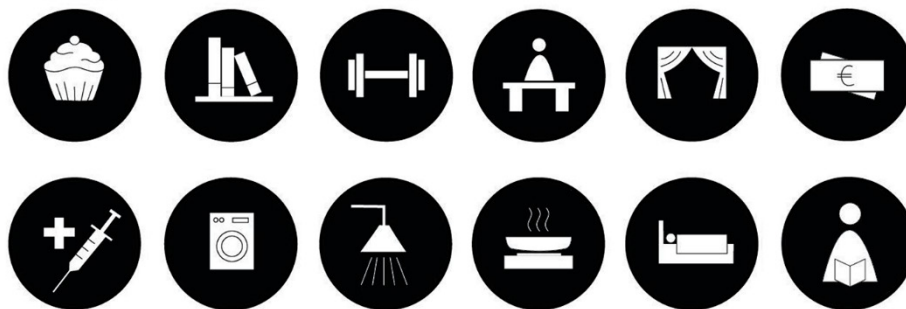


Figure 3. Set of pictograms based on planes (inverted version)

### 3. Methodology

The evaluation of design solutions for wayfinding sign system was carried out using an online survey with 125 respondents. The target group of respondents was students who live in the dorm and students who visit it. Survey included three sets of 12 pictograms described in the previous section. Using an online survey tool, students were asked to indicate what specific meaning was presented through each of the pictogram. More specifically, they used 5-point scale to rate how well the pictogram present each of the dorm facilities. Second part of the survey included multiply-choice

questions where students expressed their attitude and opinion about signage design, orientation in space and need for a wayfinding system in the dorm.

### 4. Results and discussion

Based on the students’ responses, there was no difference in preferences between the three types of pictogram sets (the set based on the lines, the set based on the planes and the invert version). The rating results for each of the pictogram are shown in Table 1.

**Table 1. Rating results**

Pictogram	Ratings (N)					Mean rating	Standard deviation
	1	2	3	4	5		
Pastry shop	1	1	8	37	77	<b>4.52</b>	0.73
Library	0	12	22	37	52	<b>4.06</b>	0.99
Gym	1	2	13	20	87	<b>4.53</b>	0.82
Cinema	28	32	39	16	9	<b>2.58</b>	1.19
Cash office	7	17	29	33	38	<b>3.64</b>	1.21
Infirmary	1	2	9	22	90	<b>4.60</b>	0.76
Administration office	28	31	42	12	11	<b>2.58</b>	1.20
Laundry	0	0	6	19	99	<b>4.74</b>	0.54
Shower room	1	1	7	15	100	<b>4.70</b>	0.68
Kitchen	11	20	34	33	25	<b>3.33</b>	1.22
Dorm rooms	0	1	3	19	101	<b>4.77</b>	0.53
Reading room	5	13	20	39	46	<b>3.86</b>	1.15

The worst rated pictograms were those for the cinema, the administration office and the kitchen. According to students' responses, main reasons for low ratings were ambiguity and the lack of context in pictograms' presentation. It is worth of noting that the lowest ratings of cinema pictogram were given mostly by students who visit the dorm, without living in it. According to respondents' suggestions, we created new design solutions for the three worst-rated pictograms (Figure 4). We used a symbol of a camera for the cinema, a symbol of a pot for the kitchen, and a symbol of a manager for the administration office. The three new pictograms were evaluated using the same methodology as in the first experiment. The rating results for the new designs are shown in Table 2.



**Figure 4. Redesign of the three worst-rated pictograms**

**Table 2. Rating results for the redesigned pictograms**

Pictogram	Ratings (N)					Mean rating	Standard deviation
	1	2	3	4	5		
Cinema	0	0	8	15	80	<b>4.69</b>	0.61
Kitchen	0	1	5	16	81	<b>4.74</b>	0.57
Administration office	1	2	8	31	61	<b>4.47</b>	0.77

Our findings indicate the importance of the communication between designers and target audience. Furthermore, the results demonstrate the benefits of testing the pictograms in early design stages before the application in the real environment.

The best rated pictograms were those with universal symbols, i.e. those pictograms whose guessability is based on previously learned knowledge. For example, the pictogram for the dorm rooms (with the symbol of the bed) was the best-rated by the most of the students.

Similarly, the corrected design of the pictogram for the kitchen (with the symbol of the pot) was also the best-rated by the most of the respondents. It seems that most of people associate the picture of pot with the part of a house which is well-known as a room for preparing a meal.

The first version of the cinema pictogram was low-rated, despite the visualization of the realistic feature of the movie theater. Apparently, for the group of people who are not familiar with the dorm area, the picture of curtains does not necessarily evoke associations similar to cinema. In contrast, participants preferred the corrected version of pictogram which was based on the depiction of movie camera.

## 5. Conclusions

When comparing the three different sets of pictograms, students did not prefer any particular design style. This may encourage graphic designers to feel free to experiment with various design styles, colors, elements and creative solutions for dorm wayfinding signage. However, the designers should use the graphic style which is in accordance with a purpose of public space and its specificities. For example, a natural style and rustic elements would probably go along with a dorm located in the forest environment.

One of the limitations of this study is the wayfinding presentation mode. The pictograms were presented without context and simulation of implementation in the real environment. Some of the respondents mentioned this as a major obstacle in the evaluation. In order to avoid the lack of context, future evaluations of pictogram designs should be conducted in

realistic conditions. This could provide more authentic results.

High percentage of respondents think that a wayfinding sign system, which is designed in line with a target audience, can facilitate the movement of visitors through the dorm area. However, these results are grounded on subjective opinion of the participants who didn't have a practical experience with orientation in the dorm environment with implemented pictograms. Future research should test pictograms in real-world conditions, including measuring the efficacy of visitors' orientation in real location.

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