

# TRANSPORTING SWIMMERS TO TEMPORARY TRAINING PLACES

How much money and time can be saved and  
emissions reduced by combining transportation

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Tiivistelmä <p>Opinnäytetyön tarkoituksena oli tutkia kuinka Jyväskyläläinen uintiseura, Swimming Jyväskylä kuljetti juniori uimareitaan väliaikaisille harjoituspaikoille Jyväskylän pääuimahallin AaltoAlvarin ollessa remontin alla. Työssä keskityttiin ajan- ja rahan säästämiseen, sekä kasvihuonepäästöjen (lähinnä hiilidioksidi) vähentämiseen.</p> <p>Alkutilanteessa vanhemmat kuljettivat vain omia lapsiaan harjoituksiin, mikä ei ollut ideaalitalanne. Tässä tilanteessa vanhemmat olisivat käyttäneet enemmän kuin kuuden työpäivän määrän aikaa lapsensa harrastukseen kuukaudessa, heidän autonsa olisivat kuluttaneet polttoainetta melkein 800 euron arvosta ja yksi auto olisi vuosittain emittoinut 1,2 tonnia hiilidioksidipäästöjä.</p> <p>Jotta olisimme voineet minimoida päästöt ja säästää ajassa, sekä rahassa, olisi vanhempien pitänyt tehdä yhteistyötä toistensa, sekä valmentajien kanssa. Tämän vuoksi Swimming Jyväskylän sivuille avattiin keskustelupalsta, missä vanhemmat olisivat voineet sopia kyydeistä. Keskustelupalsta ei kuitenkaan toiminut käytännössä ja sen vuoksi suunniteltiin helppokäyttöinen web-pohjainen kuljetusjärjestelmä.</p> <p>Rahoitusongelmasta johtuen kuljetusjärjestelmää ei otettu käyttöön, mutta opinnäytetyö antoi Swimming Jyväskylälle kuitenkin idean kuinka kuljetuksia voisi mahdollisesti yhdistää. Työ todisti kuinka kuljetusten yhdistämisellä olisi saatu säästöjä. Vanhemmat olisivat säästäneet omasta vapaa-ajastaan 40 tuntia kuussa ja yli 500 euroa vuodessa polttoainekustannuksissa. Lisäksi yhden auton vuosittaiset hiilidioksidipäästöt olisivat pudonneet 1 tonnilla.</p>		
Avainsanat (asiasanat) Swimming Jyväskylä, transportation, emissions, sports team, transportation system, money savings, time savings, emission reduction		
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Abstract <p>The goal of the thesis was to study how a sports team, Swimming Jyväskylä (SWIM) handled their junior swimmer transportation to temporary training places while Jyväskylä's main swimming hall AaltoAlvari was under renovation. The consideration points were money and time savings and reduction of emissions.</p> <p>The initial situation was that parents were driving only their own children to training places. By driving almost empty cars, the parents would have spent more than six working days amount of time on their child's hobby in a month, their cars would have consumed fuel worth almost 800 euros a year and one car would have emitted 1,2 tons of carbon dioxide (CO<sup>2</sup>) emissions to the environment annually.</p> <p>In order to minimize the emissions and reduce the time and money consumption, parents would have needed to cooperate with each other. A discussion forum was launched to help parents discuss with each other, but it was not successful. Therefore a web-based transportation system was designed.</p> <p>The transportation system was not taken into use because of financial issues, but it gave an idea for SWIM how they could combine the transportations. The thesis proved that combining the transportations, parents would have saved almost 40 hours of their own time per month, more than 500 euros of money a year and a car would have emitted 1 ton less of CO<sup>2</sup> emissions annually.</p>		
Keywords Swimming Jyväskylä, transportation, emissions, sports team, transportation system, money savings, time savings, emission reduction		
Miscellaneous		

## CONTENTS

<b>TERMINOLOGY .....</b>	<b>5</b>
<b>1 INTRODUCTION .....</b>	<b>5</b>
<b>2 SWIMMING JYVÄSKYLÄ.....</b>	<b>7</b>
<b>3 CURRENT SITUATION.....</b>	<b>9</b>
<b>3.1 Handling of Transportation .....</b>	<b>9</b>
<b>3.2 Forum for Transportation Discussions .....</b>	<b>10</b>
<b>3.3 Questionnaire and Analysis .....</b>	<b>12</b>
<b>3.4 Conclusion .....</b>	<b>15</b>
<b>4 USABILITY .....</b>	<b>15</b>
<b>4.1 Usability Process .....</b>	<b>16</b>
<b>4.2 Importance of Usability and its Improvements .....</b>	<b>17</b>
<b>5 NEW PROPOSED TRANSPORTATION SYSTEM .....</b>	<b>18</b>
<b>5.1 Creating a Route.....</b>	<b>19</b>
<b>5.2 Enrolling to a Route.....</b>	<b>22</b>
<b>6 TRANSPORTATION AS A CAUSE OF GLOBAL WARMING .....</b>	<b>24</b>
<b>6.1 Definition of Global Warming .....</b>	<b>24</b>
<b>6.2 Effects of Global Warming .....</b>	<b>25</b>
<b>6.3 Prevention of Global Warming .....</b>	<b>26</b>
<b>6.4 Transportation as a Cause of Global Warming .....</b>	<b>26</b>
<b>7 IMPROVEMENTS BY THE TRANSPORTATION SYSTEM.....</b>	<b>28</b>
<b>7.1 Ratahait Trainings and Transportation Week 5 / 2012.....</b>	<b>28</b>

<b>7.2 Time Saving .....</b>	<b>29</b>
<b>7.3 Reduction in the Fuel Consumption Costs .....</b>	<b>34</b>
<b>7.4 Emissions Reduction .....</b>	<b>37</b>
<b>7.5 Improvements and Drawbacks .....</b>	<b>40</b>
<b>8 OTHER DEVELOPMENT STRATEGIES .....</b>	<b>41</b>
<b>9 CONCLUSION .....</b>	<b>42</b>
<b>REFERENCES .....</b>	<b>44</b>
<b>APPENDICES .....</b>	<b>46</b>
<b>Appendix 1. Questionnaire of the Use of the Forum .....</b>	<b>46</b>
<b>Appendix 2. Answers of Question 5.....</b>	<b>48</b>

## FIGURES

FIGURE 1. Headlines of conversations in the forum. (Keskustelu 2012). .....	10
FIGURE 2. Print screen of the forum. (Keskustelu 2012). .....	11
FIGURE 3. Analysis of question 1. ....	12
FIGURE 4. Analysis of question 2. ....	13
FIGURE 5. Analysis of question 3. ....	13
FIGURE 6. analysis of question 4.....	14
FIGURE 7. Usability process. (ISO 13407.1999 E). ....	17
FIGURE 8. The view after logging in to the transportation system. ....	19
FIGURE 9. Creating a route, step 1.....	20
FIGURE 10. Creating a route, step 2.....	21
FIGURE 11. Creating a route, step 3.....	22
FIGURE 12. Window for Tikkakoski swimming hall for today's training. Transporters are links to carrier's timetables and routes.....	23
FIGURE 13. Transporter 3 route from Kuokkala to Tikkakoski swimming hall with two stops in the city center and Palokka (Google 2012). ....	24
FIGURE 14. The Central Statistics Office of Finland: Use of energy 2010 (Energian loppukäyttö, 2012). ....	27
FIGURE 15. Carbon dioxide emissions in Finland 1990-2010 (Liitetaulukko 2. Hiilidioksidipäästöt Suomessa 1990-2010 2012). ....	28
FIGURE 16. Jyväskylä Tikkakoski route, 23 km, 25 min (Google 2012). ....	30
FIGURE 17. Jyväskylä Muurame route, 15 km, 18 min (Google 2012). ....	31
FIGURE 18. Domestic traffic. Percentage amounts of greenhouse gas emissions.....	37
FIGURE 19. Annual carbon dioxide emissions today and when combining the transportation per car. ....	40

## TABLES

TABLE 1. Levels of swimming groups and -schools.....	8
TABLE 2. Week 5: how Ratahait handled their transportation to the swimming halls. .....	29
TABLE 3. Figures of time consumed and kilometers driven per week. ....	31
TABLE 4. Time-table for parents to transport swimmers to the training places.....	33
TABLE 5. Consumption of a new Toyota Corolla (Toyota, voit aina luottaa tulevaan 2012).....	35
TABLE 6. Annual amounts of money spend on fuel per car: Today and combined transportation figures. ....	36
TABLE 7. Emission figures for Toyota Corolla.....	38
TABLE 8. Emissions today and when combining transportation. ....	39

## TERMINOLOGY

CO2- ekv. Carbon dioxide tons

Kyytipalsta The blog giving the base for conversation of the transportation

SWIM Swimming Jyväskylä (also marked as Swimming JKL)

UCD User-centered design

UE Usability engineering

## 1 INTRODUCTION

This thesis covers a study on how a sports team, Swimming Jyväskylä, handled their junior swimmers transportation from the swimmers' homes or other destinations to the temporary training places during the renovation of Jyväskylä's main swimming hall AaltoAlvari.

The subject was chosen because the author is a former competitive swimmer and has coached swimmers for three years. In my opinion, it is important to offer junior swimmers the best and easiest way to get to their training sessions without extra effort. These swimmers are the future of national and international swimming and therefore parents, coaches and other supporters need to do their best to keep the juniors motivated and give the feeling that swimming is fun. It will not be fun if juniors need to do a lot of work and spend too much time to get to the training places.



From the professional point of view, it is important to minimize transportation costs and emissions that private cars emit. Today one of the main topics is global warming and the greenhouse effect. This thesis shows how much we can decrease emissions and transportation costs by combining the transportations carried out by parents to training places.

The concentration is on the junior swimmers. Teens and adults are able to get to training places by themselves and also because of the renovation, the number of swimming schools has been reduced and therefore they are out of consideration as well.

In order to reach the goal, these questions were answered:

1. With what tools and how is the transportation of swimmers improved when they need to get to their temporary training places?
2. How can we get parents to cooperate with each other and what kind of tools are given to help them?
3. How much could a new transportation system reduce greenhouse emissions, fuel consumption and bring more spare time for parents.

Methods used to reach the previously mentioned goals were to study the current situation, how the swimming team handled their transportation in the beginning and what kind of tools was used. After getting familiar with the initial state, a questionnaire and field study were conducted in order to know the points that needed to be improved.

## 2 SWIMMING JYVÄSKYLÄ

Swimming Jyväskylä (SWIM) is a swimming team founded in 2000, when Jyväskylän uintiseura and Saukot merged. At the moment, SWIM is one of the biggest swimming teams in Finland offering professional coaching in competitive swimming.

In the past, SWIM has raised many national level swimmers and also a few international tops; one of these is Jere Hård, a foster of SWIM, who won the European Championships in 50 meter butterfly in Helsinki 2000 and Berlin 2002. He has also made numerous Finnish records and a European record in 50 meter butterfly. Today SWIM has many young swimmers that are just about to rise to the top, such as Ari-Pekka Liukkonen who swam to ninth place in the European Championships in 2011. Also many swimmers from smaller cities move to Jyväskylä and change their swimming teams because they believe and have witnessed that Swimming Jyväskylä offers more or less the best coaching in Finland.

At the moment, Swimming Jyväskylä has about 900 members and in the season 2010-2011, 1200 swimming school participants, almost 200 swimmers, and 40 coaches were involved in the team. There are many levels in swimming schools and in competitive swimming groups; SWIM also has a non-competitive group for those who just wish to enjoy swimming without the pressure of competing as shown in Table 1 below.

TABLE 1. Levels of swimming groups and -schools.

Levels of competitive/ *non-competitive swimming	Levels of swimming schools
Talent – ryhmä (In 2011, the best junior swimmers born 1997-2001)	Vesipeuhula
Erityisryhmä (For disabled)	Pikkusammakot
Vesikiitäjät (1999 – 2002 born)	Isot sammakot
Ratahait (1997 – 2000 born)	Delfiinit
Flipperit (1995 – 2001)	Vesiralli 1
Mopit (1997 – 2000)	Vesiralli 2
Nuorten SM-ryhmä (Teen talents heading to Edustus)	Vesiralli 3
Edustus (National and international swimmers)	Tekniikkakoulu
Masters (Over 25 years old who are not part of Edustus)	Kilpauintikoulu
Harrasteryhmä (Non-competing group)	

## 3 CURRENT SITUATION

### 3.1 Handling of Transportation

Swimming Jyväskylä's main training place is AaltoAlvari, the Jyväskylä central swimming hall. The facilities include 50- and 25-meter pools and a children's pool with dressing- and shower rooms for both women and men. Also one of the main parts of the swimming hall is the spa area. It offers three pools for relaxing and water slides for children. Swimming Jyväskylä also has a cafeteria inside the facilities.

AaltoAlvari was built in the 1970s, designed by Alvar Aalto and the only facilities that have been renovated in the early 2000s are the 25-meter pool and men's dressing and shower room. The speculations when the large renovation would start had been an issue for many years and in 2010 the budget was set. In May 2011, AaltoAlvari closed its doors for months. Earlier it was estimated that the renovation would be completed in autumn 2012, but at this point the approximate finishing time is spring 2013. In spring 2012 some of the facilities will be opened for SWIM's use.

The renovation brought a lot of trouble to Swimming Jyväskylä. The team coordinator, Outi Terho, had been thinking about solutions to how the team would handle the training during this huge renovation for months before the swimming hall even closed its doors. The adult and teen swimmers have already been spending and will spend more periods of time training abroad. For the junior swimmers Terho has arranged pool space from the surrounding swimming halls in Vaajakoski, Tikkakoski, Muurame and Äänekoski.

Instead of one big swimming hall with good training facilities (25- and 50-meter pools), the juniors need to travel to swimming halls that are further away and none of them have the needed 50-meter pool. In this case, there is no sense for parents to drive just their own children to the swimming halls when they can take a full load by driving other swimmers too. With this arrangement, the parents could make the

most of their own spare time, minimize fuel consumption, and also take part in minimizing the amount of greenhouse gases emitted to the environment.

### 3.2 Forum for Transportation Discussions

From the first evacuee day till this moment, parents have been transporting only their own children to the training places. Maybe other children are transported too, but still the cars are not fully loaded. The nature of people is that they do not do cooperation with other parents if they do not know them. Although a swimming team is quite a tight organization, everybody does not know everyone and therefore the arrangements cannot be made as efficiently as possible.

To help the parents organize the transportations, together with Outi Terho, we launched a forum called Kyytipalsta operating under the SWIM's website as shown as in Figures 1 and 2:



	<b>Keskustelu</b>
> Etusivu	
> Seura	
> Postituslista	
> Mukaan toimintaan	
> Rekrytointi	
> Kilpaintyrihmät	
> Valmennus	
> <b>Kyytipalsta</b>	<p><b>Wellamon kyydit</b></p> <p>Wellamo Vaajakoski Savonmäentie 7 40800 Vaajakoski</p> <p>Viestiketjujen lukumäärä: 9 Viestien lukumäärä: 12 Viimeisin viesti lähetetty: 31.10.2011 22:47 <a href="#">Siirry keskusteluun »</a></p>
> Kilpailut	
> Uimakoulut	
> Harraste-ryhmä	
> Masters-toiminta	
> SwimShoppi - verkkokauppa	
> Kuvagalleria	
> Linkit	
> Varustepörssi	
> Yhteistyökumppanit	
> Yhteystiedot	
	<p><b>Tikkakosken kyydit</b></p> <p>Tikkakosken uimahalli Koulukatu 5 41160 Tikkakoski</p> <p>Viestiketjujen lukumäärä: 7 Viestien lukumäärä: 7 Viimeisin viesti lähetetty: 4.9.2011 21:16 <a href="#">Siirry keskusteluun »</a></p>
	<p><b>Muuramen kyydit</b></p> <p>Muuramen uimahalli Mäkeläntie 10 40950 Muurame</p> <p>Viestiketjujen lukumäärä: 7 Viestien lukumäärä: 15 Viimeisin viesti lähetetty: 17.10.2011 17:39 <a href="#">Siirry keskusteluun »</a></p>
	<p><b>Äänekosken kyydit</b></p> <p>Vesivelho Koulunmäenkatu 2 44100 Äänekoski</p>

FIGURE 1. Headlines of conversations in the forum. (Keskustelu 2012).

**Wellamon kyydit**  
 « Keskustelualueet | Uusi viesti »

Aihe	Lähtettäjä	Vastauksia	Lähetetty
<a href="#">Ke 14.12.2011 n. klo 17.50 Wellamoon</a>	Markku Hiltala	6	11.12.2011 22:51
<a href="#">Maantaina 12.12. klo 18 Wellamoon</a>	Tommi Kaapponen	1	11.12.2011 21:53
<a href="#">Lauantai 10.12.2011</a>	Tommi	0	9.12.2011 21:26
<a href="#">Torstai 8.12.2011</a>	Tommi	5	7.12.2011 19:08
<a href="#">Wellamoon ke 7.12.11 n. klo 17.30-17.45</a>	Markku Hiltala	6	6.12.2011 23:23
<a href="#">Wellamoon la 3.12. klo 11.30</a>	Tommi Kaapponen	5	1.12.2011 22:15
<a href="#">Masterskimppakvyytiä vk 48 Vaajakoskelle?</a>	Tommi Kaapponen	7	28.11.2011 11:20
<a href="#">Vaajakoskelle klo.11.30</a>	Tommi Kaapponen	0	20.11.2011 11:00
<a href="#">Wellamoon ti 22.11.2011 klo 17.45</a>	Tommi Kaapponen	7	19.11.2011 20:10
<a href="#">Wellamoon la 19.11.2011 klo 12</a>	Tommi	1	19.11.2011 9:53
<a href="#">Wellamoon ti 15.11.2011 n. klo 18</a>	Markku Hiltala	4	14.11.2011 22:07
<a href="#">la 12.11.2011 keskustasta klo 10.15</a>	Tommi Kaapponen	0	12.11.2011 9:45
<a href="#">Tiistai 8.11.2011 klo 17.30</a>	Tommi Kaapponen	0	8.11.2011 10:06
<a href="#">Lauantai 5.11.2011 klo 12</a>	Tommi Kaapponen	0	4.11.2011 20:09
<a href="#">sunnuntaina uimaan</a>	Tommi Kaapponen	3	4.11.2011 19:10
<a href="#">Wellamoon Ti 1.11. klo 18 ja muinakin päivinä (mastersit)</a>	Tommi Kaapponen	4	30.10.2011 13:22
<a href="#">Pe 28.10. klo 17.45 Wellamoon</a>	Tommi Kaapponen	0	28.10.2011 14:06
<a href="#">12.10. klo 20 treeneihin kvyytiä?</a>	Markku Hiltala	0	12.10.2011 15:04
<a href="#">uimaan vaajakoskelle!</a>	Tommi Kaapponen	0	7.10.2011 17:35
<a href="#">Kvyytiä vailla 2.10. Wellamoon</a>	Tommi Kaapponen	0	1.10.2011 20:05

[Seuraavat 20 »](#)

FIGURE 2. Print screen of the forum. (Keskustelu 2012).

We tried to make the forum function as easy as possible in the frame of the website's administrator, but before the forum was even launched, there was some doubt that people would actually use it, which was not unfounded. It is not easy to start using a system in your everyday life when it is hard to use. In the questionnaire parents and swimmers were asked about the usability of the system and many of them agreed with my opinion. The results can be seen below in paragraph 3.3.

### 3.3 Questionnaire and Analysis

The questions that were asked about the discussion forum can be seen in appendix 1. The questionnaire was sent to more than 100 people involved with Swimming Jyväskylä, including parents, coaches and swimmers, but only nine people answered. The lack of interest was anticipated. From the answerers, five were men and four were women. The answers were quite similar and many thought that the blog was not offering what it should as shown in Figures 3 – 6.

#### Question 1

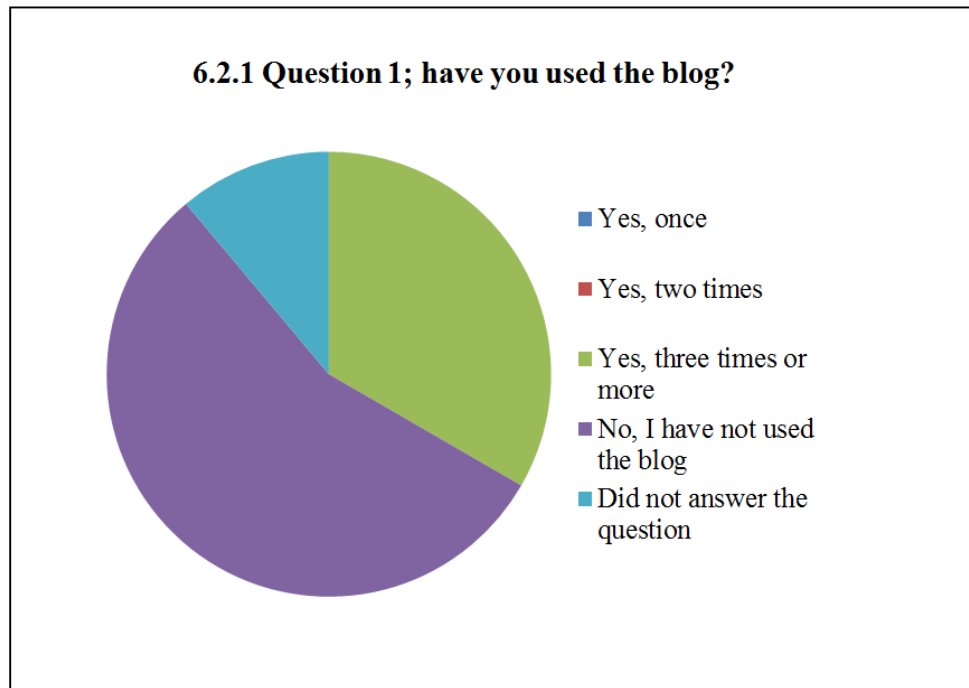


FIGURE 3. Analysis of question 1.

## Question 2

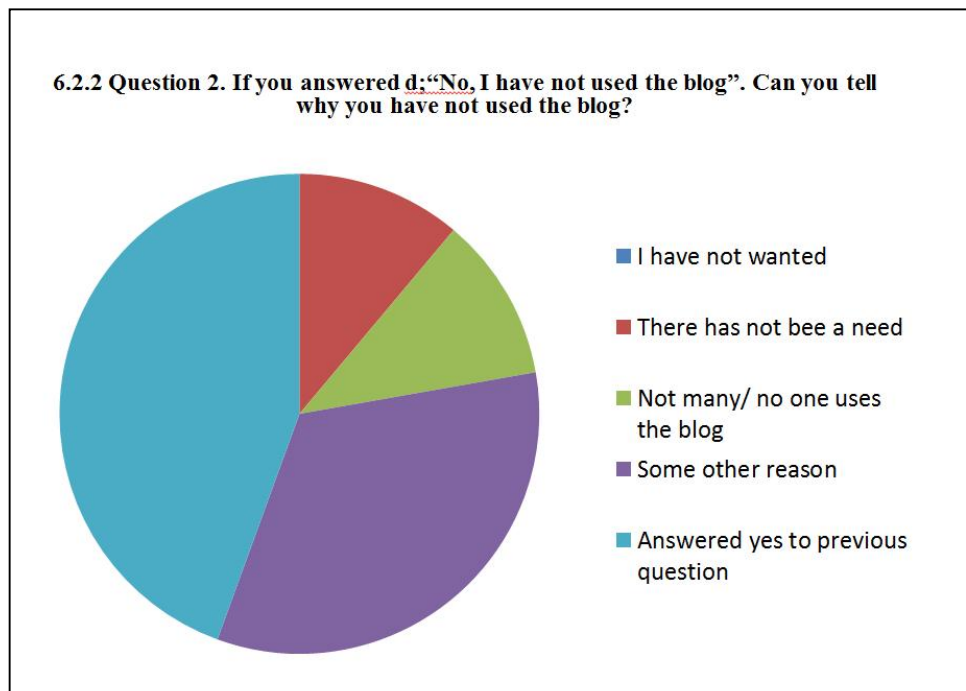


FIGURE 4. Analysis of question 2.

## Question 3

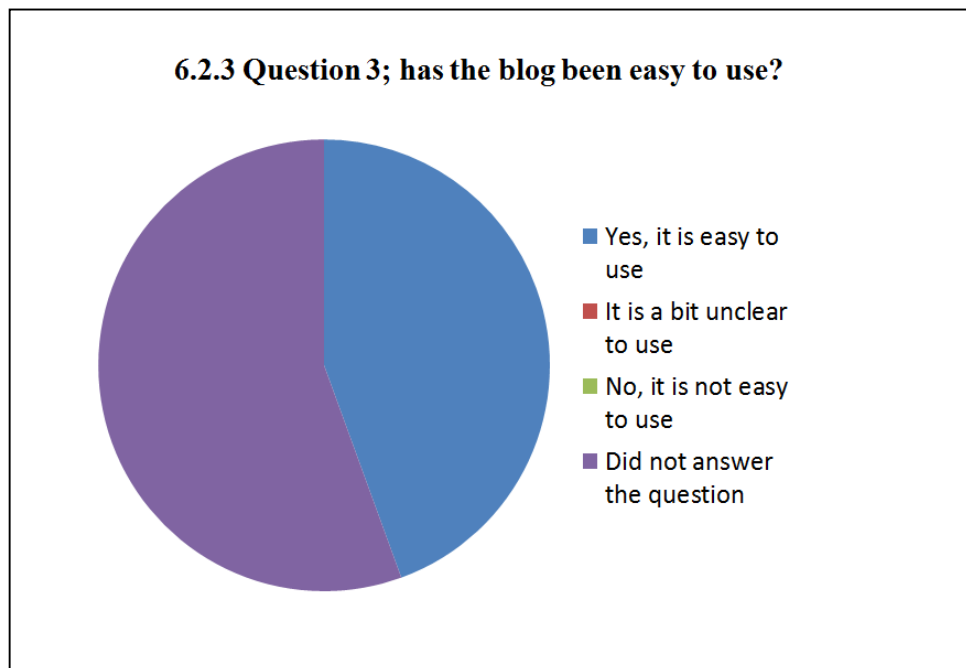


FIGURE 5. Analysis of question 3.



## Question 4

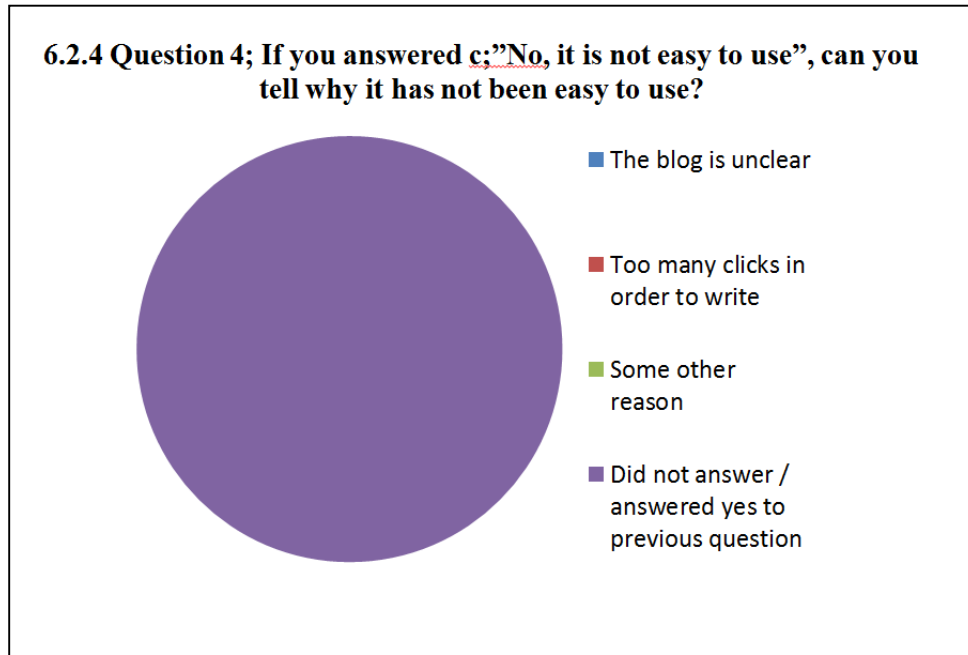


FIGURE 6. analysis of question 4.

## Question 5

The fifth question was open, so there people had the chance to say what they wanted from the forum. The same kind of attitude could be seen from almost all the answers. People thought that any kind of arranged system would work, but only if parents participated actively in the system.

The most concerning issue was that people did not participate in the conversation on the transportations. Some of the parents said that they tried to ask about the transportation in the forum, but did not get any answers.

One other thing was that the parents were concerned about the money issue. If only a few people would transport the swimmers, who would pay the fuel costs? And would coaches get free rides? They were also thinking about the fact that if they would transport other children too, would they need to drive to numerous places to

pick up the children and after the training, take everyone back home? The original answers can be seen in appendix 2. Note that the original answers are in Finnish.

### **3.4 Conclusion**

We can see from the questionnaire that most of all the members of Swimming Jyväskylä were not interested in replying to the questions. It seems that people really do not think about pollution or fuel consumption, and therefore do not want to give their opinion on the subject. And we know that normally people do not like changes, therefore the parents of swimmers are willing to transport only their own children to the training places.

At this point, parents did not know how much stress they put on the environment and how much better they could do if they changed their behavior just a little bit. But after reading this thesis, they will have the tools to do their part.

## **4 USABILITY**

Usability is defined to be a measure for quality defining how easily a system can be used. The ISO 9241-11, 1998 standard also defines usability to be an *“extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use”*. By combining usability with utility; the system provides the features needed, we get a useful system (Usability 101: Introduction to usability 2012).

Usability is defined by five quality measures which are learnability, efficiency, memorability, errors and satisfaction. Learnability means how well a user can do basic tasks when he uses the system for the first time and efficiency means how quickly a user can perform the tasks after learning to use the system. After a while,

when the user returns to the system, how well can he remember how to use it? This is the memorability of the system. Errors measure the error rate and how severe they are and satisfaction means how content the user is after using the system. (Nielsen 1993, 26.)

#### **4.1 Usability Process**

There are four human-centered design activities that should take place during a system development project. These activities are

- a) to understand and specify the context of use,
- b) to specify the user and organizational requirements,
- c) to produce design solutions,
- d) to evaluate designs against requirements, (ISO 13407, 1999).

The human-centered design process should start at the earliest stage of the project (e.g. when the initial concept for the product or system is being formulated), and should be repeated iteratively until the system meets the requirements (ISO 13407, 1999. Human-centered design processes for interactive systems. Helsinki, Finnish Standards Association SFS. 34p), seen in Figure 7.

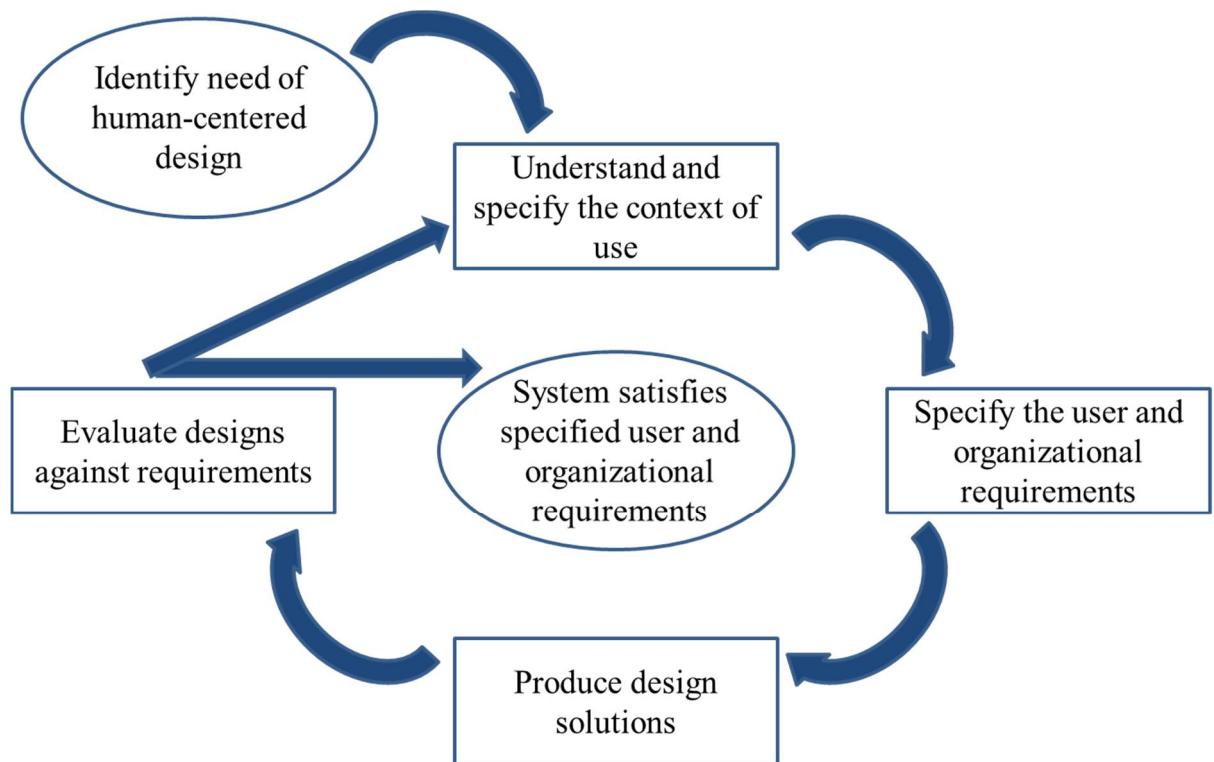


FIGURE 7. Usability process. (ISO 13407.1999 E).

## 4.2 Importance of Usability and its Improvements

Usability is an important issue in webpage based systems. If we consider the facts that the page is hard to use, the user gets lost on the website or the page does not answer the questions the user has, the result is that the user leaves the website and does not come back. The purpose of usability is to make the webpage easy to use and so that relevant information can be found easily. (Usability 101: Introduction to usability, 2012)

If the user cannot find e.g. a product he is willing to buy, how can he buy it? In order to improve the usability of the website so that the user finds what he is looking for, improvements need to be made. User testing is how the usability improvement of the website can be made. It involves three steps; contacting customers, asking them to make certain tasks and observing how they do it. (Usability 101: Introduction to usability, 2012)

## 5 NEW PROPOSED TRANSPORTATION SYSTEM

Because the conversation through the forum was not working, a transportation system for SWIM was designed. In case the transportation systems would be easy to use, people would use it more than the forum, and it would also be better than calling people and arranging the transportation by phone.

The purpose was to show that using the system; we would be able to minimize the transportation costs that come from fuel consumption, and also to reduce emissions that are emitted to the environment by private cars. Because we cannot be sure that in every case we would be able to get a full load, the assumption is used that in each car, there will be three swimmers out of the full four.

The transportation system would be operated by an individual website; not included to the Swimming Jyväskylä's website. There could be a link to the website in Swimming Jyväskylä's own website, from where people would find the website for the transportation easily.

For everybody using the website, a user's ID and a password would be created. Users would log in to the website with their IDs so that the system would not be public for everyone. After logging in, the user would see a window of information of today's training, future training sessions and also user's own information. Today's trainings, timetables, my information, create a route and contact would be links to other windows seen in Figure 8 below.

The screenshot shows a blue-themed web interface. In the top right corner, it says "Welcome Jenni Flink!". On the left side, there are four light blue buttons with white text: "Timetable of the groups", "My information", "Create a route", and "Contact Swimming JKL". The main content area is a white box with a blue border. It starts with the heading "Today's trainings:". Below this, there are three lines of text, each underlined: "Vesikiitäjät / Tikkakoski / 17:00", "Ratahait / Tikkakoski / 18:00", and "Flipperit / Muurame / 19:00". In the bottom right corner of the interface, the date "Monday 19.12.2011" is displayed.

FIGURE 8. The view after logging in to the transportation system.

## 5.1 Creating a Route

In "My information", the user could input their own information, such as the phone number and home address or the address of the starting point if they are a transporter. After that creating the route is easy (see Figure 9). On the first page after logging in, there is a button for creating a route. The user goes to that window and it opens up the route creation form.

**Creating a route**

Your home address:  
Polttolinja 1, 40520 Jyväskylä

If you wish to leave from another point. Please press here.

**Destination:**

Vaajakoski swimming hall

Tikkakoski swimming hall

Muurame swimming hall

Äänekoski swimming hall

**Back to first page**

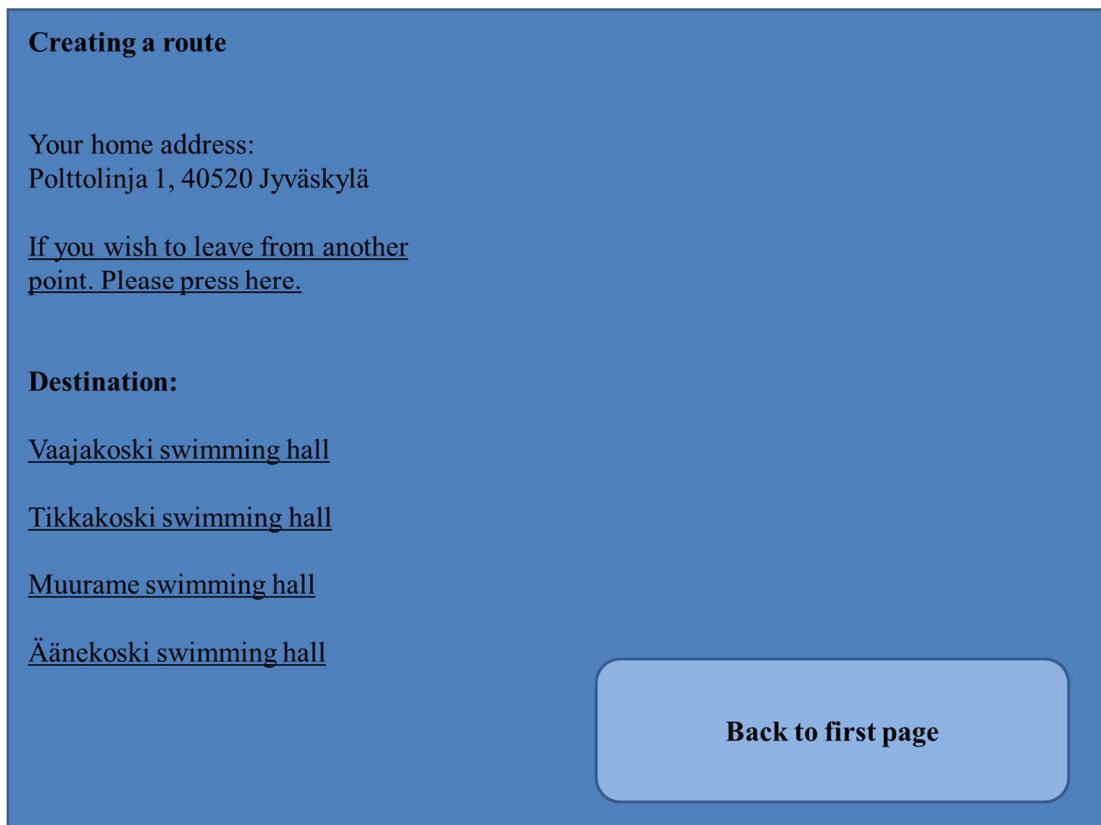


FIGURE 9. Creating a route, step 1.

There the user inserts the information of the departure time and to which swimming hall they are going to. The user also has the possibility to change the point of origin. After clicking the destination, the system will automatically guide the user to a window where he can insert the departure time (Figure 10). After inserting the time, he/she can push a button to create the route. The system will automatically calculate the fastest route from the point of origin to the destination and will only take those passengers that are on that route.

**Tikkakoski swimming hall**

Insert time of departure:

**The program will calculate the fastest route to your destination.**

If you are willing to change your route in case of need, **please press here.**

**Create a route**

FIGURE 10. Creating a route, step 2.

If he/she wishes, the user can push the button; “If you are willing to change your route in case of need, please press here”. This means that when other users enroll for that route, they can be picked up from a point that is not on the original route. After the enrollment, the system calculates the fastest route including the point that is not on the original route. If the user does not press the button, it is only possible to enroll from a point that is on the original route.

After pressing “create a route”, the system will create the route and will show the summary of the created route (Figure 11). After this, the transporter will get a sms message when changes happen. The changes can be as follows; someone enrolls to the route, someone cancels their enrollment or the car has a full load, - in this case 4 passengers. The number of passengers, phone number and point of origin can be changed in “My information”. Obviously when a person creates a route, it means that he/she transports a round trip.



**Dear Jenni Flink, you have successfully created a route:**  
Transporter 3

**Point of origin:**  
Polttolinja 1, 40520 Jyväskylä

**To:**  
Tikkakoski Swimming hall

**Departure time:**  
17:00

**Maximum passengers:**  
4

Now other users can register to your ride.

You will get a sms when someone enrolls to your ride and also when you have a full load.

The sms will tell you where to pick the passengers up and you may also check the points from the website:  
**19.12.2011 / Ratahait / Tikkakoski / 18:00 / Transporter 3**

[Back to first page](#)

FIGURE 11. Creating a route, step 3.

## 5.2 Enrolling to a Route

If a person wishes to enroll to today's training transportation, he needs to press the training "Ratahait / Tikkakoski / 18:00" from Today's trainings section, (Figure 12). A window opens where the user can see different transporters going to the specific swimming hall. Although "transporter x" is used here, in real life there would be the name of the person transporting that certain route. There would also be the departure time and the name of the original point, for example: Transporter 3 would really be Jenni Flink / Kuokkala / 17:00.

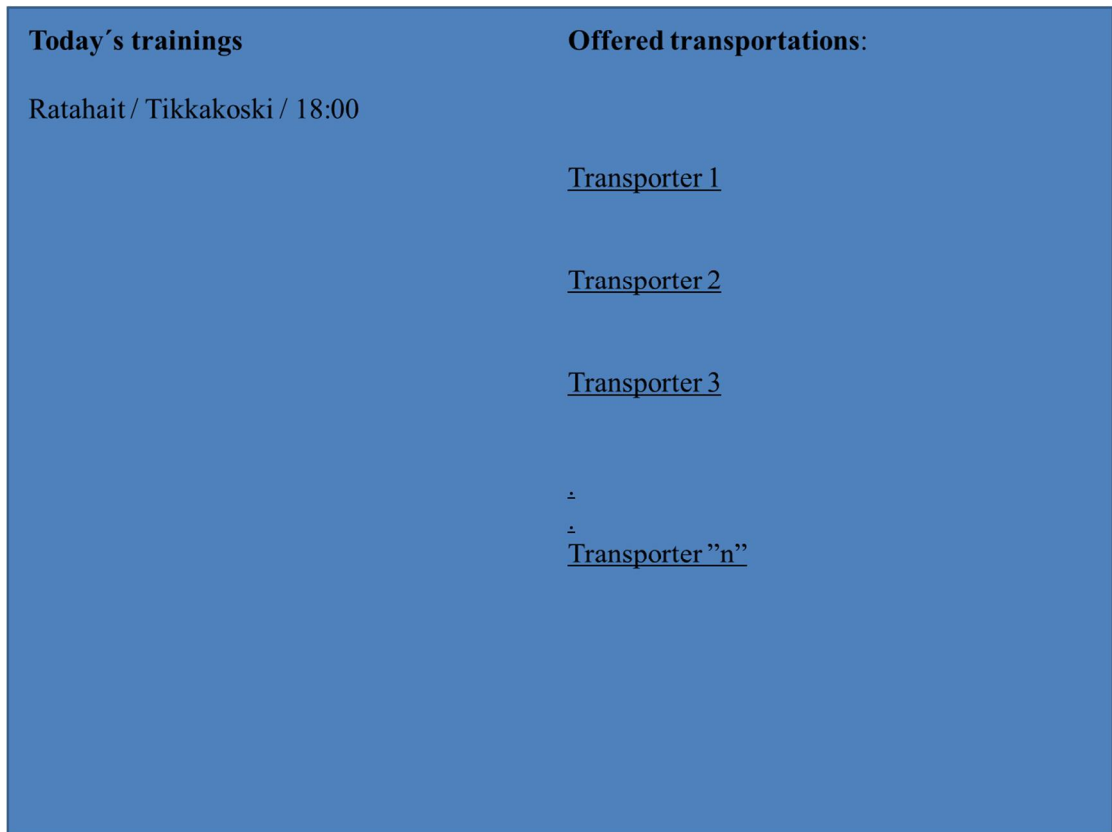


FIGURE 12. Window for Tikkakoski swimming hall for today's training. Transporters are links to carrier's timetables and routes.

When the swimmer or their parents choose the suitable transporter for them, they will click the name. The link will open a window where the swimmer can see the route. He/she can choose a point in the route where he would like to be picked up. The point can be on the route or not, depending on what the creator of the route has chosen. The system will calculate the period of time when the passenger needs to be at that point. Below in Figure 13 you can see a screen shot taken from Google Maps; it gives an idea of what the system might possibly look like.

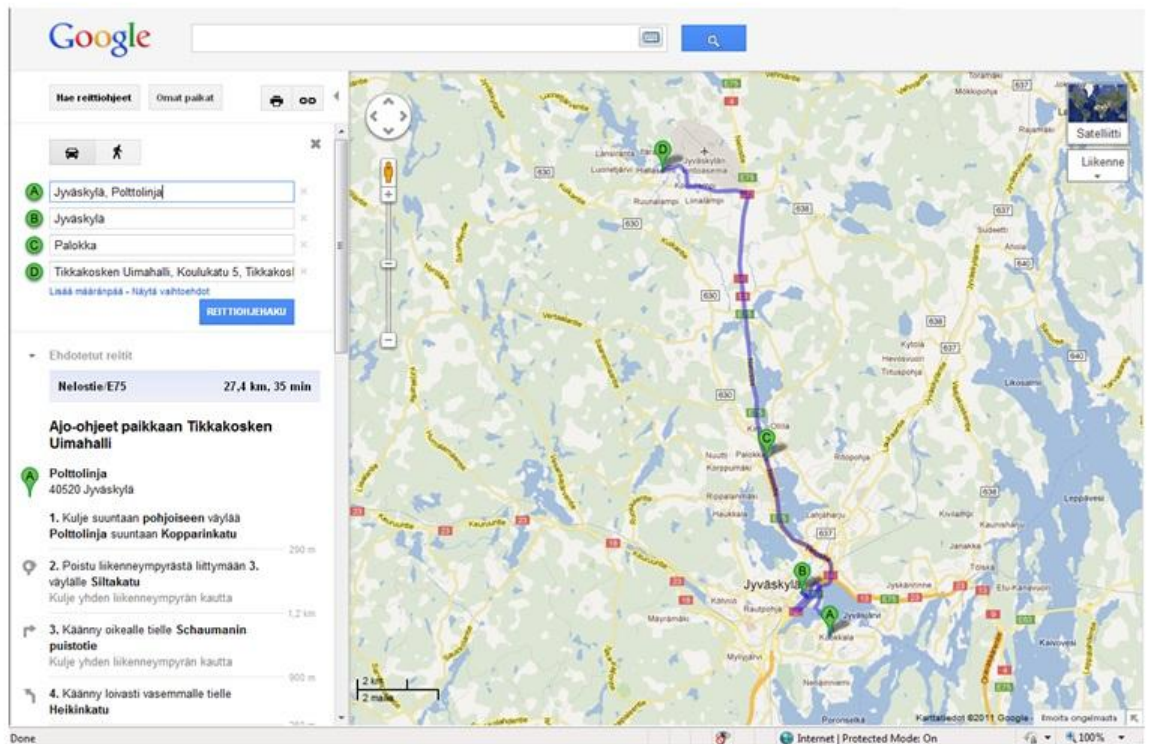


FIGURE 13. Transporter 3 route from Kuokkala to Tikkakoski swimming hall with two stops in the city center and Palokka (Google 2012).

## 6 TRANSPORTATION AS A CAUSE OF GLOBAL WARMING

### 6.1 Definition of Global Warming

Global warming is one of the main issues people talk about today. In one way it is a good and essential phenomenon, which means that because of global warming, the temperature on the Earth is approximately 15 degrees Celsius. Without the global warming, the temperature on the Earth would be -18 degrees Celsius (Ilmastonmuutos lyhyesti 2012). Although the phenomenon is essential for human

beings, during the last five decades, the actions of people have caused global warming to become an alarming issue for our wellbeing.

Global warming is defined to be the effect that greenhouse gases have on the climate of the earth (Global warming definition 2012). The two most common greenhouse gases are carbon dioxide and methane.

Greenhouse effect means that the atmosphere lets the sunlight come on to the Earth, but does not let all the warmth go away from the Earth, instead it is reflected back. Let's consider a real greenhouse which is made of glass or a certain kind of a plastic. The windows let the sunlight (infrared radiation) come in and the plants use the light to photosynthesis. Photosynthesis produces heat radiation, but instead of letting the heat go out, the windows reflect the radiation back and the temperature inside the greenhouse rises. The temperature rise stops when the incoming light is as much as the outgoing heat radiation (What is the Greenhouse Effect 2012).

## **6.2 Effects of Global Warming**

Although global warming is essential for us, the innovations of cars, beauty products, use of oil and all other things that have been developed for the need of human beings have caused the global warming to increase and it has terrible effects. These effects are e.g. the global temperature rise, the melting of the polar icecaps and the sea level rise.

During the last 100 years, the temperature on the Earth has risen by 0,74 degrees Celsius and in Europe almost one degree Celsius. We also know that 11 hottest years out of 12 were between 1995 and 2006 (Ilmastonmuutos lyhyesti 2012).

Also melting of the polar icecaps causes the sea levels to rise; diseases spread because of the temperature rise and extreme weather will be common in the entire world. In a few decades, tsunamis, tornados and other dangerous natural catastrophes could be common in our everyday lives. (Global Warming Effects 2012).

### **6.3 Prevention of Global Warming**

Because global warming is such an alarming issue today, everybody should do their part by small everyday choices. People should use bikes more, walk or use public transportation instead of driving their own car or possibly change their car into a hybrid or an electric one. (Prevention for global warming 2012)

The light bulbs in homes should be changed to energy-efficient fluorescents and all home appliances should be changed to low-energy ones. Also electronic devices should be unplugged when they are not in use. (Prevention for global warming 2012)

Clothes should also be washed in cold when possible and always in full loads. The time you spend in the shower should be minimized and everyone should recycle and take his own bags to the supermarket. People should prefer local and fresh food. (Prevention for global warming 2012)

### **6.4 Transportation as a Cause of Global Warming**

When considering the diameter of Finland, we know that our country is small. Therefore road transportation is the most popular and the most efficient one in logistics. Also individual people prefer private cars. Below in Figure 14, can be seen the percentage amount of energy the traffic used in 2010.

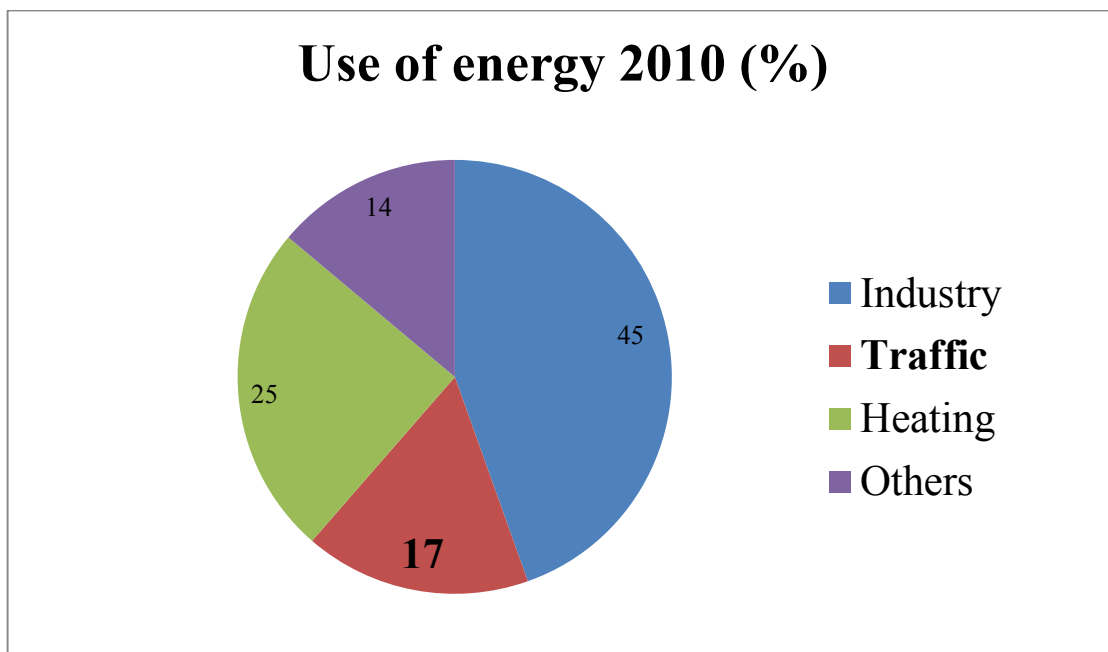


FIGURE 14. The Central Statistics Office of Finland: Use of energy 2010 (Energian loppukäyttö, 2012).

Because we need to transport goods and people, we cannot always think about reducing the number of trips. In my opinion, we should make sure that the trucks, buses and cars are fully loaded.

The Central Statistical Office of Finland tells that the amount of greenhouse gas emissions was more than 74 million carbon dioxide tons (CO<sub>2</sub>- ekv.) (Vuoden 2010 kasvihuonekaasupäästöt lähes taantumaa edeltäneellä tasolla 2012). The amount was almost 9 million tons more than the previous year and with that it rose above the level Kyoto Protocol has set up. In Figure 15 below, you can see the carbon dioxide emissions in Finland in 1990-2010.

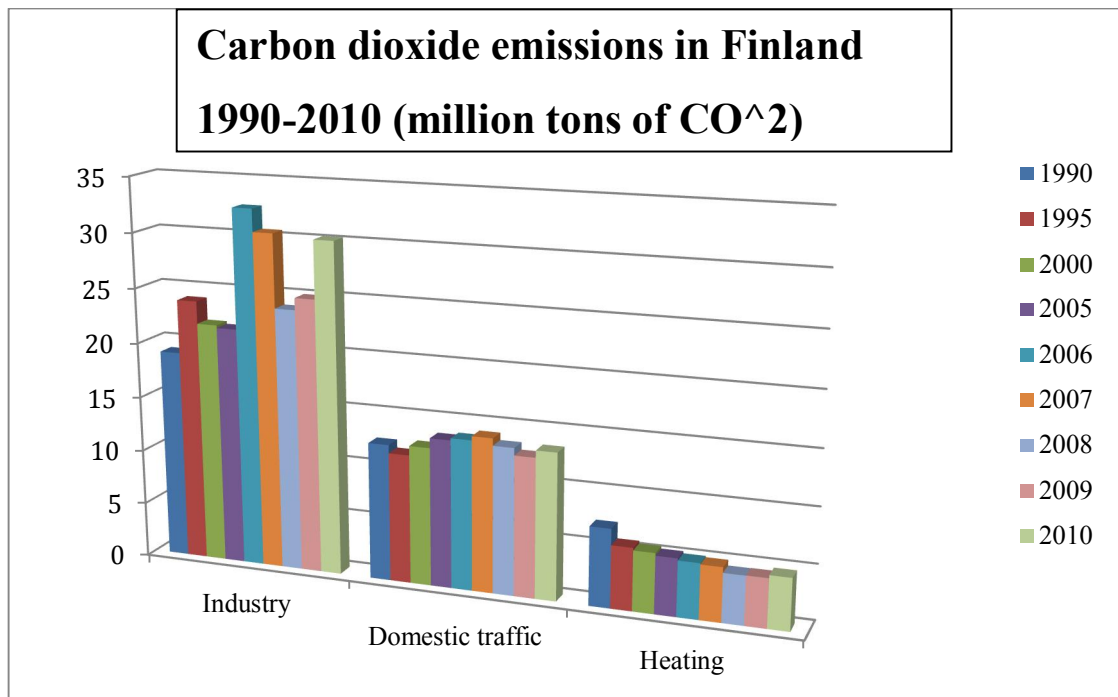


FIGURE 15. Carbon dioxide emissions in Finland 1990-2010 (Liitetaulukko 2. Hiilidioksidipäästöt Suomessa 1990-2010 2012).

## 7 IMPROVEMENTS BY THE TRANSPORTATION SYSTEM

### 7.1 Ratahait Trainings and Transportation Week 5 / 2012

Ratahait trains five times a week and they have training sessions in two different swimming halls: Tikkakoski and Muurame. They have 18 swimmers with 16 parents and three coaches. A field study on how Ratahait transported their swimmers to the swimming halls in week 5 was conducted, as shown in Table 2.

TABLE 2. Week 5: how Ratahait handled their transportation to the swimming halls.

Date	Place	Swimmers / cars	Average / car
Monday	Tikkakoski	8 / 4	2
Tuesday	Muurame	11 / 10	1,1
Thursday	Muurame	11 / 9	1,222
Friday	Muurame	4 / 4	1
Sunday	Muurame	5 / 3	1,666
<b>Average of the whole week 39 swimmers with 30 cars equals total average of 1,3 swimmers/car</b>			

The figures show that the transportation is not economical (with group Ratahait) even though swimmers and their parents have had the blog in their use. If parents combined transportations to the training places, we would be able to reduce greenhouse gases emitted to the environment, parents would have more spare time and they would save in fuel costs.

## 7.2 Time Saving

If we look at the group Ratahait, on an average, every parent is taking their own child to all the trainings. This means driving from home to Tikkakoski or Muurame and back five times a week.



It takes 50 minutes to drive from Jyväskylä to Tikkakoski and back to Jyväskylä, to and 36 minutes round trip from Jyväskylä to Muurame. In Tikkakoski there is one training session per week and in Muurame there are four trainings a week, which means in time, 3 hours 14 minutes per week, as shown in Figures 16 and 17 and also in Table 3.

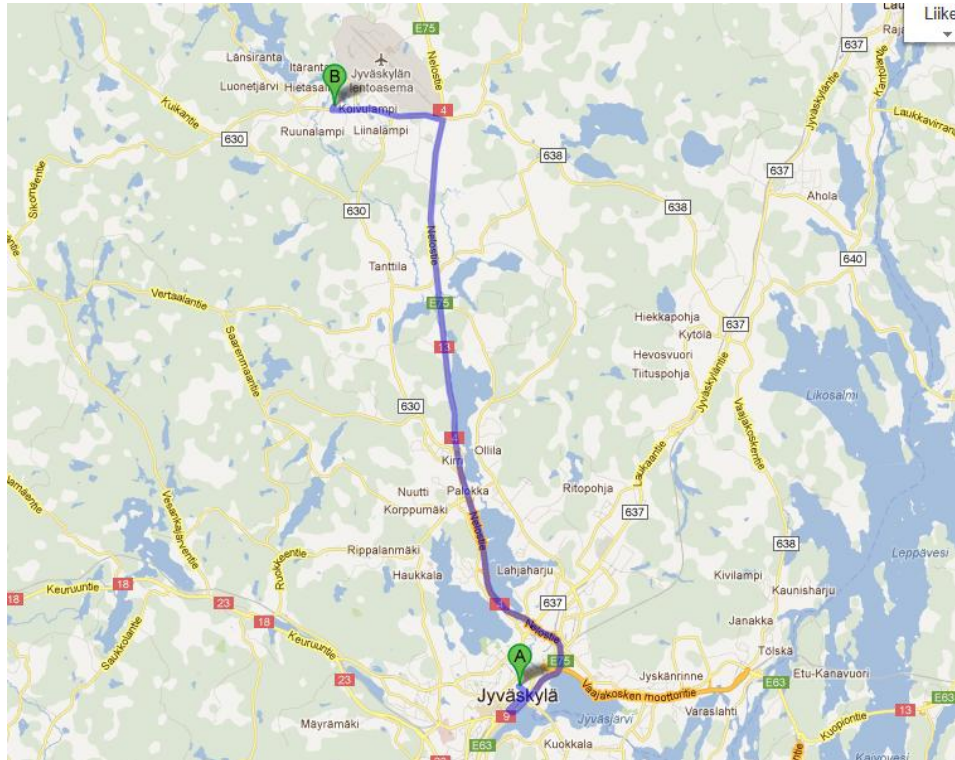


FIGURE 16. Jyväskylä Tikkakoski route, 23 km, 25 min (Google 2012).



If we consider that the parent stays at the destination waiting for the training to end, it means two hours more of waiting time per training equaling 10 hours per week. On the other hand, if we assume that the parent is going back to Jyväskylä and returning to pick their child up, the amount of time spent is twice the time spent on driving per week. This means 6, 4 hours = 6 hours 24 minutes per week and then we also need to note that the amount of fuel consumed will also be doubled.

When we combine the two figures, we get six and a half to 13 hours of parents' own time per week that they are putting to their child's hobby. I am not saying that this is a bad thing, but by dividing the responsibility among all the parents, we could ease the amount of stress parents are having.

The swimming group Ratahait has 18 swimmers, from which two times siblings, meaning 16 parents and training five times a week. It is most uncertain that all the swimmers are not able to participate in all the trainings and therefore it can be assumed that in all the training sessions there will be 15 swimmers.

This means that we would need four cars per each training; in three of them a full load, and in one, there would be three passengers. 16 parents, five trainings a week and four cars per training means that each parent needs to transport a full load of passengers five times per month, as shown in Table 4.

TABLE 4. Time-table for parents to transport swimmers to the training places.

	Monday	Tuesday	Thursday	Friday	Sunday
<b>1<sup>st</sup> week</b>	Parent 1 (P1)	P5	P9	P13	P1
	P2	P6	P10	P14	P2
	P3	P7	P11	P15	P3
	P4	P8	P12	P16	P4
<b>2<sup>nd</sup> week</b>	P5	P9	P13	P1	P5
	P6	P10	P14	P2	P6
	P7	P11	P15	P3	P7
	P8	P12	P16	P4	P8
<b>3<sup>rd</sup> week</b>	P9	P13	P1	P5	P9
	P10	P14	P2	P6	P10
	P11	P15	P3	P7	P11
	P12	P16	P4	P8	P12
<b>4<sup>th</sup> week</b>	P13	P1	P5	P9	P13
	P14	P2	P6	P10	P14

	P15	P3	P7	P11	P15
	P16	P4	P8	P12	P16

Let us examine the time consumed by parent 1. Normally, parent 1 would transport only his own child to trainings five times a week, once to Tikkakoski and four times to Muurame. We will assume that he/she will wait for his child at the destination. This means he is spending  $13 \text{ h} * 4 \text{ weeks} = 52 \text{ hours}$  on his child's training sessions a month. This is more than six days' work.

If parent 1 would combine transportation among the other parents, he would transport swimmers to training places five times a month; once to Tikkakoski and four times to Muurame. This arrangement would decrease the time spent from 52 h per month to 13 h per month.

### 7.3 Reduction in the Fuel Consumption Costs

In this case, let us assume that all the parents are a driving Toyota Corolla, the most popular car among Finnish people. A new Corolla uses E10 benzene and we will be using the combined figure (see Table 5) of fuel consumption since the route will include both, city and country road driving.

TABLE 5. Consumption of a new Toyota Corolla (Toyota, voit aina luottaa tulevaan 2012).

Type of consumption	Consumption (l/ 100 km)
City	7,2
Country	5,0
Combined	5,8

If we consider that parent 1 is driving only his own child to training, he will spend enormous amounts of time and also he will pay for a lot of fuel. He will drive to Tikkakoski once a week and also four times he will visit Muurame. This means that he will spend  $2 \cdot 23 \text{ km} + 8 \cdot 15 \text{ km} = 166$  kilometers for the trips each week and therefore 664 kilometers per month. This means:  $(5,8 \text{ l} / 100 \text{ km} =) 0,058 \text{ l/km} \cdot 166 \text{ km} = 9,628$  liters a week and  $0,058 \text{ l/km} \cdot 664 = 38,512$  liters a month. The fuel container in a Toyota Corolla is 55 liters.

On the 20<sup>th</sup> of February 2012, the fuel price for E10 in Jyväskylä was € 1.599 euros per liter, at the lowest and € 1,616 euros per liter on an average (Jyväskylä, 20.02.2012). We will be using the average price. If parent 1 would transport only his own child to all the training sessions, he would be paying approximately  $9,628 \text{ l} \cdot 1,616 \text{ euros/l} = € 15,56$  a week for the transportation. It seems like it is not much, but if we consider the monthly  $38,512 \text{ l} \cdot 1,616 \text{ euros/l} = € 62,24$  or the annual 12 months  $\cdot € 62,24 = € 746,82$  amounts that are spent on the transportation, the amounts of money are enormous.

On the other hand, if we consider that parent 1 will combine the transportation with the other parents, the amounts of money spent on fuel will be decreased

considerably. In week 1, parent 1 will transport swimmers two times; once to Tikkakoski and once to Muurame. The other three weeks, he drives to Muurame once a week. In the fuel price this means for week 1 approximately  $0,058 \text{ l/km} * 76 \text{ km} * 1,616 \text{ e/l} = 7,12 \text{ euros}$  and for the other weeks approximately  $0,058 \text{ l/km} * 30 \text{ km} * 1,616 \text{ e/l} = 2,81 \text{ euros}$  per week. Monthly the amount would be  $1 * 7,12 \text{ e} + 3 * 2,81 \text{ e} = 15,55 \text{ euros}$  and annually  $12 \text{ months} * 15,55 \text{ e} = 186,6 \text{ euros}$ . The amount of money spent can be seen in Table 6.

TABLE 6. Annual amounts of money spend on fuel per car: Today and combined transportation figures.

<b>e/l</b>	<b>1,616</b>
<b>Price / week / car</b>	15,56 e
<b>Price / month / car</b>	62,24 e
<b>Price / year / car</b>	<b>746,82 e</b>
<b>Combined transportation:</b>	
<b>Price/week / car</b>	2,81 – 7,12 e
<b>Price / month / car</b>	15,55 e
<b>Price / year / car</b>	<b>186,6 e</b>

By sharing the transportation, the amount used for fuel could be reduced from 750 euros by more than 500 euros. This amount could be used to support the swimmer by other means; by paying for coaching or swimming hall fees or buying swimming suits and other necessary equipment

#### 7.4 Emissions Reduction

In Finland, from greenhouse gases that come from the domestic traffic, more than 90 percent come from road traffic, Figure 18 and from that 90 percent, 60 % comes from private cars. From the total amount of all the factors that causes the greenhouse effect in the Finnish atmosphere, 20 % comes from traffic. (Liikenteen ympäristövaikutukset 2012)

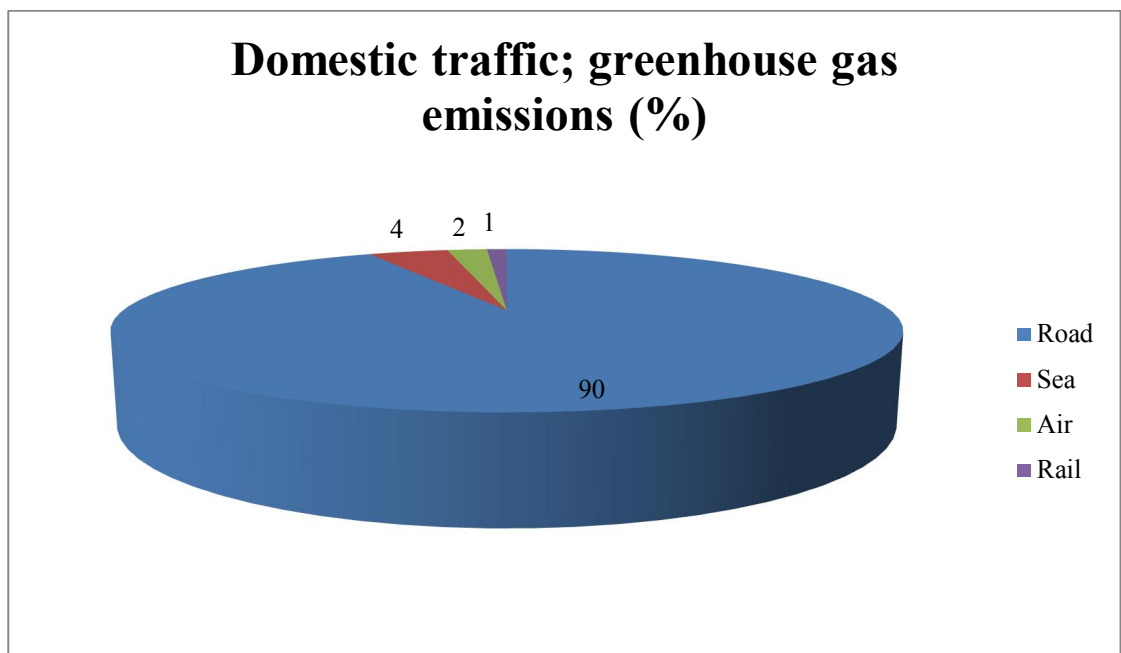


FIGURE 18. Domestic traffic. Percentage amounts of greenhouse gas emissions.



In order to calculate how much a car driving to Muurame and Tikkakoski five times a week emits different types of emissions, we need to know what the emission figures per kilometer are. We will consider Toyota Corolla (Toyota, voit aina luottaa tulevaan 2012) seen in Table 7 below. After calculating with the present situation and combined kilometers, the results can be seen in Table 8.

TABLE 7. Emission figures for Toyota Corolla.

Type of emission	Figure (g/km)
CO2 city	165
CO2 country	115
CO2 combined	133
Carbon monoxide (CO)	0,27
Hydrocarbon (HC)	0,04
Nitrogen oxides (NOx)	0,03
Particles (PM)	Unknown

TABLE 8. Emissions today and when combining transportation.

	CO2 City	CO2 country	CO2 combined	Carbon monoxide (CO)	Hydrocarbon (HC)	Nitrogen oxides (Nox)	Particles (PM)	Driven kilometers		Notes:
<b>Toyota Corolla (g/km)</b>	165	115	133	0,27	0,04	0,03	Unknown			
<b>Today:</b>										
Weekly emissions	29370	20470	<b>23674</b>	48,06	7,12	5,34	-	178		
Monthly emission	117480	81880	<b>94696</b>	192,24	28,48	21,36	-	712		4 weeks*178 km
Annual emissions	1409760	982560	<b>1136352</b>	2306,88	341,76	256,32	-	8544		12 months*712 km
<b>Combined transportations:</b>										
Weekly emissions	5445	3795	<b>4389</b>	8,91	1,32	0,99	-	33	79	Depending on the week
Monthly emission	29370	20470	<b>23674</b>	48,06	7,12	5,34	-	178		1*46km + 4*33km
Annual emissions	352440	245640	<b>284088</b>	576,72	85,44	0	-	2136		12 months* 178 km

As can be seen above, by combining the transportation the amount of emissions could be reduced remarkably. The combined CO2 emissions of a car will be reduced from 1,1 tons per year to less than 300 kilograms a year (Figure 19). If we think about that Ratahait has 16 parents with 16 cars, the amount reduced will be almost 13 tons a year.

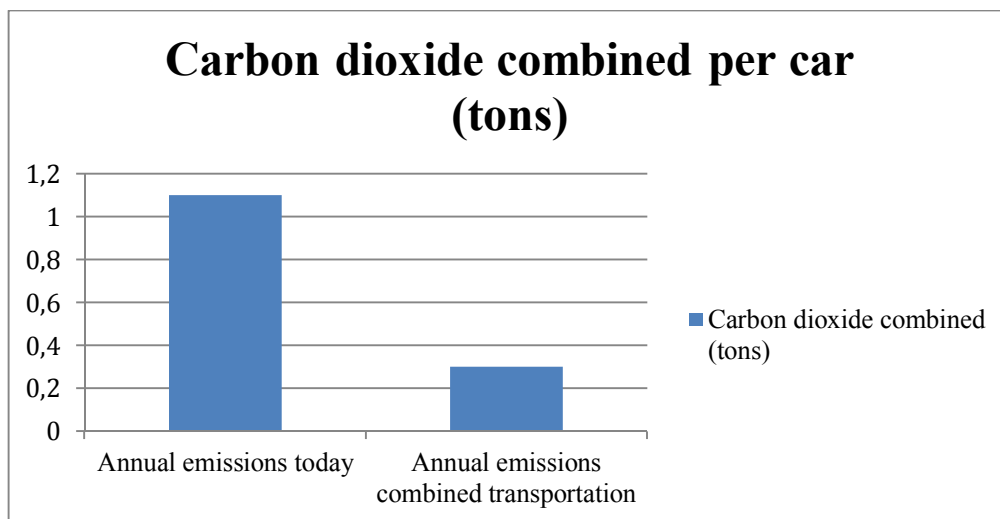


FIGURE 19. Annual carbon dioxide emissions today and when combining the transportation per car.

## 7.5 Improvements and Drawbacks

The previous section proved that when combining transportation to the temporary swimming halls, Swimming Jyväskylä would be able to reduce the amount of time parents are using for their child's hobby per week and also they would save a lot in fuel costs per year. And the most remarkable issue was found out how much greenhouse emissions could be reduced by cooperation.

Of course the results in this study are not a 100 percent liable. The study on how many cars will be going to training sessions was limited, because only one group in one week was considered. Why other groups was not considered or more weeks studied is because the author thought that the best way was to study only one group since there are different aged children in other groups; some of them might use the bus and the behavior of parents can be different because in some groups the parents are close friends and in some other groups they do not even talk to each other. And the author only studied one week, because the cooperation did not work as smoothly as I hoped; I had to ask about the results many weeks before I got the results after week five.

Another reason why the thesis is not a 100 percent liable is that it was assumed that 15/18 swimmers will be participating in training sessions, the number can be different and therefore it will affect the study. Also it was assumed that all the parents were driving a Toyota Corolla, which is not true. Some parents were driving older cars which mean that the fuel consumption and emissions will be bigger, and some parents are driving cars that have a smaller fuel consumption and emission figures.

## **8 OTHER DEVELOPMENT STRATEGIES**

The best way to combine the transportations would seem to be the proposed transportation system. Parents and swimmers do not need to spend money on calling one another or phoning to many parents only to hear that all the cars are full. We are modern people and we use computers and the internet in our everyday life, why should we not let the technology help us with this, too?

But because of money, the transportation systems cannot be taken into use and therefore some other possibilities to combine the transportations were also considered. One possibility is that SWIM could arrange a meeting each month or every second month, where they would decide on who will transport the swimmers, to what destination, and on which days. The problem here is that not all the parents would be able to come to all the meetings and maybe they could not find dates that suit everyone. In order for this to happen, people would need to make compromises, but who would not compromise for 600 euros a year?

Another improvement could be to change the forum from Swimming Jyväskylä's website to Facebook. Many people use Facebook and it could be easier to talk there than on Swim's website. It might also be a smart move to pay the transporters. If there are only a few people that would be able to transport the swimmers, they should be entitled to some sort of compensation. Perhaps each swimmer could pay some amount of money for each trip or the amounts could be included in the

coaching fees. There could also be some kind of reward system from where active parents could get compensation for their time consumption and fuel costs.

Coaches should also be entitled to free rides from parents if they need one because most of SWIM's coaches are students that coach as a hobby. Of course they get a small paycheck for their work and mileage to the temporary training places, but it is as much as a hobby as it is a work. If a coach cannot make it to the training place because of the lack of transportation, the training session is cancelled.

## **9 CONCLUSION**

The main goal of this thesis was to combine the junior swimmer transportations to temporary training places while Swimming Jyväskylä's main swimming hall AaltoAlvari is under renovation. The first situation was that parents were driving only their own children to the training places, and although a forum for discussion was launched, the combined transportations were not arranged. Therefore the aim was to develop tools to help the parents to arrange the transportations in order to save their time and money and also to reduce the amount of emissions emitted to the environment.

In the thesis it was studied how parents were transporting, how much time and money they were spending and what amount of greenhouse emissions they are emitting to the environment by driving only their own children to the trainings. After knowing the results, it was calculated how much money and time they would spare and how much less emissions there would be emitted to the environment by combining the transportations and then finally the two results were compared.

Conclusion was that combining transportations would be the best move regarding the environment and also the parents. With the combinations, we would be able to reduce the amounts of emissions that the cars emit to the environment and also the parents would save a lot of money, and, in addition they would have more time to

spend on other things. This would decrease the stress for the parents and the amount of the load we are putting on our environment.

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## APPENDICES

### Appendix 1. Questionnaire of the Use of the Forum

I made a questionnaire which was sent to all the members of Swimming Jyväskylä through email. The members are board members, parents, coaches, swimmers and other volunteers. The amount of questionnaires sent was more than 100.

#### 1. Have you used the blog?

- a. Yes, once
- b. Yes, two times
- c. Yes, three times or more
- d. No, I have not used the blog

#### 2. If you answered d; "No, I have not used the blog". Can you tell why you have not used the blog?

- a. I have not wanted
- b. There has not been a need to use it (arranging transportation in another way)
- c. Because not many/ no one reads the blog **or** the transportation cannot be arranged through the blog since not many/ no one uses the blog.
- d. Some other reason, what?

**3. Has the blog been easy to use?**

- a. Yes, it is easy to use
- b. It is a bit unclear to use
- c. No, it is not easy to use (difficult)

**4. If you answered c; "No, it is not easy to use", can you tell why it has not been easy to use?**

- a. The blog is unclear, I cannot find necessary information
- b. To be able to write on the blog, I need to click too many times
- c. Some other reason, what?

**5. Free feedback: Here you may write what do you think about the blog? Do you think it is functional? In your opinion, in what ways we would be able to increase the number of people using the blog?**

## Appendix 2. Answers of Question 5

Answer 1:

Tuntuu ettei olla vielä ihan valmiita/totuttu hoitamaan tämän tyyppisiä asioita sähköisesti. Moni varmasti odottelee halukkaita kyyditsijöitä ilmaantuvaksi eikä vapaaehtoisesti ilmoittaudu itse kyyditsijäksi. Voisi olla helpompi jos siellä olisi valmiina muutama kyyti johon vain voisi ilmoittautua. Kyyditsijät tietysti tulisi ennalta sopia - voisiko vastuuttaa vuorotellen jokaisen uimarin vanhemmalle eli aikatauluttaa valmiiksi? Kyytejä voisi lähteä eri puolilta Jyväskylää (Palokka, Jyskä, uimahallin piha jne.).

Answer 2:

Minusta mikä tahansa tapa järjestää yhteisiä kyytejä on hyvä. Jonkinlainen taulukkotyyppinen systeemi voisi toimia paremmin, jossa voisi panna rastin ruutuun, mihin kyytiin tulee ja milloin. Tämä tietysti vaatisi jonkun kokoamaan kyydit yhteen ja ylläpitämään niitä.

Answer 3:

Laitoin ilmoituksen, mutta blogin kautta en saanut yhtään vastausta järjesteltiin henk kohtaisesti kyytejä - jäi vähän epäselväksi yhteystietojen näkyvyys? Sain ainakin kommentin, että sitä kautta ei löytynyt?

Ihan hyvä systeemi, kun vaan saadaan kaikki käyttämään. Yksi mikä minua mietityttää - kustannusten jakaminen? Silloin ok, jos kaikki ajavat tasapuolisesti. Mutta jos jollain ei ole autoa tmv tai yksi ajaa koko ajan Äänekoskelle ja toiset Vaajakoskelle jne. Minusta olisi reilua sopia asia avoimesti esim säännöt, jottei asiasta jää mitään kenenkään hampaan rakoon - tällaisesta voi tulla piiiiiiiiiiitkää aikainen epäsopu ja vaikuttaa lapsienkin yhteishenkeen - välillisesti vanhempien kautta (epämiellyttäviä lauseita joistain perheistä). Valmentajien kускаaminen? Ilmaista?

Answer 4:

Pitäisi tietää ketä asuu lähellä, jos pitää joka tapauksessa mennä keskustaan tms. viemään lapsia "hakupaikkaan" niin silloin koko kimppakyytiajatus vesittyy. Toisaalta en minäkään halua kerätä autollista porukkaa eri paikoista ja vastaavasti ajaa vielä toisinpäin takaisin.

Answer 5:

Kai se toimiva olisi jo sitä useammat käyttäisivät. Alkukesästä yritin järjestää tyttärelleni kyytiä useamman kerran ja vain valmentaja vastasi. Perustelut kimppakyytien käyttöön ovat hyvät, ei ole resursseja lähteä kускаamaan lasta montaa kertaa viikossa edestakaisin treeneihin. Toivottavasti kyytipalsta olkaa toimimaan ja useammat käyttävät sitä, muuten saattaa jäädä uimarilta treenejä väliin.