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Introduction

Danes eat less fish than recommended by health authorities. Children in the age range 10-17 years only eat 105 g fish per week, one third of the recommended 350 grams per week.1 Considering that Denmark has over 8.5 km of coastal line, and the lack of access to good fishing waters. Eating fish, especially fatty fish, contributes to the polyunsaturated fatty acid 03 to the diet, which has a positive effect on cognitive function and reduces the risk of cardiovascular disease.2,3 Exposure to unfamiliar or novel healthy foods like fish, vegetables, fruit etc. can increase children’s diet variety.4,5,6 A varied diet including healthy foods is assumed to be beneficial for health and part of a healthy lifestyle, also later in life.7,8 As humans we evaluate food based on sensory properties, anticipated consequences of ingestion, and ideas about its nature or origin.9 In order to accept a novel food, it has to be categorized as “safe”.10 Furthermore, acceptance is also influenced by the child’s habits, the context and social setting in which the food item is met.11,12

Fresh whole fish still have all their organs, have a particular smell and natural slime-cover. Visual, olfactory, and touch perceptions are all important to understand what kind of exposure reduces children's food neophobia.13

The objective of this study is to investigate the experiential and sensory-based experiment: Gyotaku (a traditional Japanese fish printing technique) as a way of breaking through the disgust barrier when it comes to children accepting fish.

Methods and Materials

Intervention design

The gyotaku experiment is the first experiment in a 5 week theme course on fish developed for FCS in 5th – 6th grade (5 x 3 lessons of 45 min.). This experiment is suitable for 2-3 lessons of 45 min. As part of the 5 week theme course the pupils will learn how to evaluate freshness, gut, filet, cook and make a recipe. Furthermore, they will learn about the senses, nutrition, food waste, preservation techniques, food culture, and sustainable fishing. The 5 week theme course on fish was developed for the main intervention, that was conducted in the spring 2017 with 16 classes on Zealand (n=321).

In the gyotaku experiment the pupils work together in groups. They pick up the fresh fish, followed by washing it under cold water to remove the slime. After that they dry the fish and place it on a cutting board. Squid ink is applied by using a sponge. A piece of paper is placed horizontally on the fish and by striking the fish the paper is cut into the fish. The paper is removed and the gyotaku is done.

Results and Discussion

Typical initial reactions were disgust. This was expressed both verbally (looked disgusting, smelled ‘fishy’ and felt ‘slimy’), and with mimics and sounds indicating disgust. The first barrier was to pick up the fish. This pupils handled this by supporting each other. They typically were two to pick up the fish and wash it. It was a ‘us-against-them’(the fish), which Sennett (2013) calls a win-win exchange strategy, when working together on experiments.14

Over the Gyotaku process stage, the disgust reaction started to change to curiosity and exploration. Studies combining taste play as a way of promoting food acceptance for the age group of this study population could not be identified, but Nederkom, Jensen, and Havermans (2010)15 and Coutard and Thiaker (2015)16 found a tendency of reduced neophobia in relation to fruit and vegetables as a result of taste play in pre-school children. This is supported by Sennett (2009): “play is a school for learning in the sensitivity of children’s bodies”.17

Even though disgust signs seemed to reappear in the filleting process, this was quickly converted to a “this is how it is” approach. Also even though the pupils frequently asked for advise in the process, they were very explicit about not wanting practical help. They wanted to do it themselves: an expression of autonomy, which Ryan and Deci (2000) has identified, in the theory of self determined behavior, as one of the main factors in promoting motivation and engagement together with competences, and relatedness.18 This could also be an expression of what Sennett (2009) calls the emotional reward for attaining a skill: Pride in their work.19

The majority of pupils chose to taste their fried fish filet; also pupils that showed intense disgust in the beginning. This observation is supported by Birch (1999), that preferences for food are learned via practical experience with food.20 Furthermore, by finding data by Mustonen and Turtola (2010) in Finland, Alfaro and colleagues (2016) in Spain18, and Jarpe-Rainer and colleagues (2016) in USA.21 Nevertheless, studies on experiential-based education in schools have yet to demonstrate a time stable change in food preferences and liking for novel foods.22

Conclusions

This observational study showed that by using the fish as a creative and sensory-based medium facilitated curiosity and thereby exploration of other aspects of the fish, e.g. the anatomy of the fish. Furthermore, this experiential teaching method was observed to deeply engage the pupils in their class work. The observations also revealed that, the pupils’ disgust, as a result of the visual, olfactory and tactile challenge, with working with fresh whole fish, can be overcome through craftsmanship, autonomy and working together in groups.

Finally, observations revealed that disgust – being a fruitful and forth on a continuum, where barriers like picking up the slimy fish is a point of disgust, then the disgust declines during the printing process, but takes a small loop back starting the filleting. In the end, when the fillets are fried, observations showed that liking is predominant. Probably because it now looks like something the pupils know, and categorize “safe” to eat.

References

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Image 1: Flounder (Platichthys Flavolepidus) and gyoatiku print of it. Photo credit: Nordic Food Lab (Anna Kristensen)

Image 2: Picking up the fresh fish. Photo credit: Nordic Food Lab (White Hag)

Image 3: Pupils with their gyotaku print. Photo credit: Nordic Food Lab (Marit Kjærheim)

Image 4: Pupils experimenting with fish. Photo credit: Nordic Food Lab (White Hag)

Image 5: Pupils filleting and eating their fish. Photo credit: Nordic Food Lab (White Hag)