Integrating Health Promotion, Learning and Sustainability in school foodscapes - the LOMA case study.

Ruge, Dorte

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Integrating health promotion, learning and sustainability in school foodscapes

- The LOMA case study

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Dissertation, Jan 2015.

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Preface

This PhD thesis was based on data from the LOMA case study that I conducted from 2011 to 2014. My study was focused on the development and implementation of the LOMA-Local food meal system (LOMA) at Nymarkskolen, a secondary school in Svendborg. It was a unique case that concerned the first LOMA school ‘foodscape’ in Denmark.

I use the notion of foodscape as a way to capture the structures and complexity of a multilevel school food intervention. In this sense the school foodscape was constituted by the physical, organisational and socio-cultural spaces, where students learned about food, cooked food, shared meals, talked about food and encountered food related messages about health and sustainability.

I have studied the LOMA school foodscape during the imagined, the exploratory and the implemented stages and it was an exciting trajectory through spaces of food, health, sustainability and learning. During my study I also had the opportunity to present preliminary insights from my study at conferences in Denmark and abroad. Findings are included in this dissertation and I am delighted to invite the reader on a ‘foodscape journey’ through smooth and striated spaces of conceptual frameworks for learning, participatory health promotion and integrated modes of public food procurement.

This research was made possible through a partnership between the Municipality of Svendborg, University College Lillebaelt (UCL), Department of Research & Development\(^1\) and Aalborg University (AAU), Faculty of Planning. The municipality of Svendborg funded the costs for all educational activities related to the development project, including re-building of the school. The costs for the research project was co-financed by UCL and AAU. No commercial funding or donation was involved.

Dorte Ruge

January 2015.

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English Summary

Improving children and young peoples’ health is a significant societal challenge in both developed and developing countries. Childhood obesity has risen during the last 10 years and is associated with an increased risk of cardiovascular diseases and diabetes. Moreover, obese children tend to be more isolated and have a lower self-esteem than their peers. Contemporary challenges in the domain of public health include the improvement of dietary patterns that are founded in early childhood. Studies have shown that eating behaviour tends to track into adulthood and early prevention is therefore important. Schools and school food systems are considered as well-suited ‘settings’ for interventions that aim at counteracting unhealthy eating habits. Studies indicate that for a health promoting intervention to be effective, a whole school approach to healthy eating should be integrated with educational activities at school.

This focus on the school environment has a settings-based point of departure compared to more individualised approaches. Apart from health promotion, some schools also integrate the dimension of sustainable public food procurement in the school meal system. Nymarkskolen in Svendborg is an example of a school that chose an innovative, integrated system and implemented the LOMA-Local Food programme. The development and implementation of the LOMA program, that is also called the LOMA foodscape - served as a unique case for this research. The aim of this dissertation is to investigate and answer the following research questions:

"How did the LOMA school foodscape influence students’ development of food- and health related action competence (HRAC) and healthier eating habits? "

"How did the LOMA school foodscape influence the development of methods that led to sustainable, local, public food sourcing practices (SPFS)?"

Research was conducted as a single-case study based on primarily qualitative methods. Data was collected through interviews, observations, video-footage and interviews with students, teachers and other key-persons. Data has been collected during the imagined, the exploratory and the implemented stages. For complimentary use, a quasi-experimental intervention study of a two-week intervention among 9th grade students was conducted based on quantitative methods (LOMA-13). This intervention study was embedded in the total case study of the LOMA school foodscape in order to get a broader
picture of the effects. Results showed that students’ development of components in food and HRAC and healthier eating habits was influenced in a positive way through participation in LOMA educational activities.

Various forms of student participation led to increased development of components of food and HRAC, such as knowledge (about vegetables and food production), insight, motivation, ownership, cooperation and critical thinking about food and health. In this research, components of HRAC were regarded as basic building blocks in a healthy life and a democratic citizenship. There were indications, that the implementation of the LOMA school foodscape resulted in healthier eating habits among students, mainly due to the introduction of a shared meal for all students and their respective teachers each day in the week.

Results indicated that students experienced ‘sense of coherence’ when they participated in LOMA activities, especially when they were cooking school food for peers together with professionals. There were some indications that the shared meal as a socio-cultural mechanism reduced purchases of unhealthy food in the supermarket during break. There were also negative effects of the implementation that to some students were too demanding. Results indicated that students did have knowledge about factors for living a healthy life style, but found it difficult to act upon their knowledge. Furthermore, students seemed to have low expectations towards own ability to change current and future life style in a healthier direction. In general students seemed to have an ambiguous relation to food and health, which was closely related to their ongoing processes of self-orientation.

In addition to these findings, results indicated that the LOMA school foodscape influenced the local development of sustainable public food sourcing (SPFS) practices in a positive way through the municipal contracts that facilitated food sourcing from local farmers and suppliers. A preliminary record for the first half-year of 2014 shows app. 50% organic and app. 40% local food of the total LOMA purchases. The establishment of a production kitchen at the school, as an output, facilitated the use of fresh produce from local producers and a limited use of processed food. The intermediate outcome of these processes was a contribution to re-localisation of food chains, shortening of food chains and an increased understanding among participants of how school food can contribute to sustainable development. This was mirrored in an increasing acknowledgement among teachers of the cross-curricular learning potential in the LOMA foodscape and how this could contribute to the implementation of the 2014 Danish School Reform.

Based on the presented results, the LOMA school foodscape seemed to have led to positive immediate outcomes. Both with regard to students’ development of food and health-related action competence and the local development of sustainable, public food sourcing strategies. The results may not come as a surprise compared to similar school food studies. However, the news value of this study is related to the fact that LOMA, based on the 7 principles, takes place in a Danish context, where food at school in general is regarded as a ‘private’ issue and where placeless, public food is mostly delivered to institutions by large wholesalers. The LOMA school food approach is an example of the multiple benefits that an integrated school food system can bring. Internal validity is strong for this case, but external validity should be further investigated in future research. Regarded as a public health intervention the implementation of LOMA benefit from the fact that it was made permanent. Therefore, a subsequent follow-up study is recommended in order to measure both long-term outcomes.
Dansk sammendrag (uddrag af Phd afhandling: ”Integrating health promotion, learning and sustainability – the LOMA case study” (2015).


Foruden sundhedsfremme, integrerer nogle kommunale skoler også bæredygtige indkøb af den mad, der skal spises på skolen i madordningen. Nymarkskolen i Svendborg er et eksempel på en skole, der anvender en innovativ, integreret tilgang i form af LOMA-Lokal Mad (LOMA). Udvikling og indførelse af dette skole ‘foodscape’ har udgjort en unik case for nærværende forskningsprojekt, da Nymarkskolen er det første sted hvor LOMA konceptet med de 7 principper anvendes i Danmark. Formålet med denne afhandling er derfor at undersøge og besvare følgende forskningsspørgsmål:

”Hvordan påvirkede LOMA foodscape elevernes udvikling af henholdsvis mad- og sundhedsrelateret handlekompetence (HRAC) og sundere spisevaner? ”

”Hvordan påvirkede LOMA foodscape udviklingen af metoder, der førte til en kommunal, bæredygtig, indkøbspraksis for Nymarkskolens madordning (SPFS)?”


Resultaterne tyder på, at elevernes udvikling af mad- og HRAC samt sundere spisevaner blev påvirket på en positiv måde gennem deltagelse i LOMA undervisningsaktiviteter. Forskellige former for deltagelse førte til øget udvikling af komponenter mad- og HRAC, såsom viden (om grøntsager) indsigt i fødevareproduktion, motivation, ejerskab, samarbejde og kritisk tænkning. Disse komponenter af HRAC betragtes som grundlæggende byggesten i et sundt liv og i et demokratisk funderet medborgerskab. Endvidere var der indikationer på at elevernes generelle lærings- og identitets processer udgjorde den grundstruktur som viden om mad og sundhed blev indlejret i.

Endvidere tydede resultaterne på at gennemførelsen af LOMA medførte sundere spisevaner blandt eleverne - primært på grund af beslutningen om at indføre et fælles måltid for alle elever og deres respektive lærere hver dag i ugen. Resultaterne indikerer,
at flertallet af eleverne har oplevet sammenhæng og meningsfuldhed, når de har deltaget i LOMA aktiviteter, især når de har deltaget i madlavning i køkkenet sammen med køkkenpersonalet.

Der var endvidere indikationer på, at det fælles måltid også førte til reduceret indkøb af usunde fødevarer i supermarkedet i forbindelse med frokostpausen. Enkelte studerende angav i interviews, at de sociale krav i forbindelse med LOMA var for store for eksempel i forbindelse med det fælles måltid. Resultaterne tydede endvidere på, at de studerende havde viden om sund livsstil, men at deres forventninger var lave i forhold til at forbedre egen nuværende og fremtidige sundt livsstil. Denne frem for tvetydighed i elevernes forhold til mad og sundhed er en problemstilling der bør adresseres direkte i kommende interventioner.


Resultatet af disse processer var et bidrag til re-lokalisering af fødekæder, kortere fødekæder, samt en øget forståelse blandt deltagerne af, hvordan skolemåd kan bidrage til bæredygtig udvikling. Der var også en øget fælles forståelse blandt lærerne af det tværfaglige læringspotentiale i LOMA og af hvordan dette kan bidrage til implementeringen af den forestående skole reform i 2014.

Baseret på resultaterne, har implementeringen af LOMA medført en række positive resultater. Både med hensyn til elevernes udvikling af mad- og sundhedsrelateret handlekompetence samt i forhold til den lokale udvikling af bæredygtige, offentlige madstrategier.

Resultaterne kommer måske ikke som en overraskelse i forhold til lignende studier af skolemadsordninger i andre lande. Nyhedsværdien af dette case studie består primært i, at LOMA er blevet implementeret i en dansk sammenhæng, hvor mad på skolen ellers i overvejende grad betragtes som et ‘privat’ anliggende og hvor offentlige fødevareindkøb som oftest er ‘stelvækket’ og bliver leveret via større grossister.

LOMA på Nymarkskolen i Svendborg er et eksempel på de mange fordele, som en integreret skolemadsordning kan medføre.

Den interne validitet er stærk i dette studie, men den eksterne validitet er svag på grund af de valgte forskningsmetoder med case studiet, aktions forskning og et mindre quasi-ekperimentelt studie. Til gengæld er det tilstræbt at give en transparent redegørelse for hvordan forskningen er udført.

Set i et bredere perspektiv er det et vigtigt element, at indførelsen af LOMA som en offentlig sundheds intervention nu er permanent på Nymarkschoolen i de kommende år. Dette muliggør, at der gennemføres et opfølgende studie med henblik på at kortlægge resultaterne fra implementerings fasen yderligere samt at undersøge resultaterne på længere sigt.
List of Publications

PhD. thesis papers


2. Ruge, D., Kromann Nielsen M., Mikkelsen B.E., Jensen B.B.: Examining participation in relation to the development of students’ health related action competence in a whole school food context: Insights from the LOMA case study. (Submitted to *Health Education*)

3. Ruge, D., Jensen B.B., Mikkelsen B.E. What did they learn?: Students’ development of food and health-related action competence - results from the LOMA case study. (Manuscript, 2015).

"This thesis has been submitted for assessment in partial fulfilment of the PhD degree. The thesis is based on the submitted or published scientific papers, which are listed above. Parts of the papers are used directly or indirectly in the extended summary of the thesis. As part of the assessment, co-author statements have been made available to the assessment committee and are also available at the Faculty. The thesis is not in its present form acceptable for open publication but only in limited and closed circulation as copyright may not be ensured."
Definitions of terms:

**Re-localisation of food chains**: A strategy for increased local food production and local consumption. For instance the food chain between public institutions and local suppliers.

**Institutional foodscape**: The physical, organisational and socio-cultural space where guests or clients encounter food and health related messages.

**Integrated school foodscape**: The integrated school foodscape is the physical, organizational and sociocultural space in which students participate in meals, cooking, food related curriculum and encounter food messages - including health and sustainability messages.

**Whole school approach to healthy eating**: An approach that integrate healthy school meals with the encouragement of healthy eating as part of curriculum.

**LOMA approach**: An integrated approach that integrates a whole school approach to healthy eating with creative public food procurement and student participation in 'cooking school food' together with professionals - as integrated in curriculum.

**IVACE method**: A health promoting school based method for monitoring students’ participation, involvement and influence in health promoting educational activities (Investigation-Vision-Action-Change-Evaluation).
II. List of abbreviations

WHO = World Health Organization
WS = Whole School approach
NS = Nymarkskolen
LOMA = LOkal MA (= Local Food)
HPS = Health Promoting Schools
HRAC = Health-Related Action Competence
SPFS = Sustainable Public Food Sourcing strategies
IVAC = Investigation, Vision, Action and Change
IVACE = Investigation, Vision, Action, Change and Evaluation
CMO = Context, Mechanism, Outcome
AR = Action Research

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Table IV: Summary of output and outcomes (stage 1)
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Table VI: Summary of output and outcomes (stage 3)
Table VII: The RE-AIM framework and the LOMA intervention study.
Overview of the Ph.D. dissertation.

The introduction provides a background for the two and a half year case study that followed the development and implementation of an integrated school meal programme, LOMA-Local Food (LOMA) at a secondary school in Denmark. Within the field of social science, the conceptual framework included: Constructivist theories of learning, health promoting schools, and alternative food geography and foodscape studies. This framework constituted the conceptual foundation of the study and was applied in an interdisciplinary approach in order to capture the complexity of the food environment at the school and in the LOMA programme. The impact was measured by the following outcomes:

1) Students’ development of food and Health-related Action Competence (HRAC) as learning outcomes.
2) Students development of healthier eating habits (HeH)
3) Local development of Sustainable, Public Food Sourcing Practices (SPFS)

The methods section accounts for the case study method and how the single case study design was used to follow the development of the case over a two-and-half year period. In addition to this an action research approach was applied. This meant that the researcher participated in the LOMA-community of practice (LOMA-CoP) that conducted the development project. Moreover, that the researcher participated in an action research sub-system regarding the development of educational activities for students together with teachers. From the beginning of 2012 till the end of 2013, the LOMA-CoP initiated and evaluated practical, hands-on, food and cooking activities as integrated in curriculum.

The ‘LOMA foodscape journey’ is presented as a narrative in this report from the case study. It is structured according to a chronology, which corresponded with the developmental stages of the LOMA foodscape: 1) The Imagined, 2) The Exploratory and 3) The Implemented LOMA school foodscape. The purpose is to unfold the complexity of the dynamic foodscape in its different stages over time and space as well as the interplay between stakeholders in the surrounding fields. For each stage there is a special focus on the relations between the activities in the intervention and the outputs and outcomes. A brief account of the journey is provided below:

1) The imagined LOMA school foodscape (2011): This section concerned the first stage that was characterised by the joint efforts from practitioners and researchers to develop a new and integrated approach to food at school. Focus was directed to the initial processes and the establishment of a ‘community of practice’ – a LOMA-CoP.

2) The exploratory LOMA school foodscape (2012): This section provided an account of how the LOMA concept was developed, both at the level of the school and at the public food governance level. The stage aimed at securing an optimal implementation of LOMA. Teachers and researcher investigated, tested and trained during four pilot-projects. Through the action research system they explored, how students’ participation and learning could be integrated into educational activities. Meanwhile, the school was rebuilt and at the municipal level, new local public food sourcing strategies were developed.
Preliminary results from the study of this stage were published in Paper I: ‘Local Public Food Strategies as a Social Innovation – early insights from the LOMA case study’. Insights regarding students’ participation were presented in Paper II: “Examining participation in relation to students’ development of food and health-related action competence in a whole school food setting: Insights from the ‘LOMA’ case study”.

3) The implemented LOMA school foodscape (2013): This section concerned the final implementation stage of LOMA, where experiences from the explorative stage were drawn upon. The study focused on how the daily life of the school was restructured as a result of systemic change. Joint efforts were required to comply with ‘being a food school’, whereby students participated in cooking school food as integrated into their learning processes.

Focus was also directed to whether the municipal development of methods had led to sustainable food sourcing practices

Results from this stage were based on the analysis of primarily qualitative data and complementary data from a quasi-experimental intervention study (QEIS) and presented in Paper III: ‘What did they learn? Students development of food- and health-related action competence – results from LOMA case study’.

In the discussion section outputs and outcomes are discussed according to scientific contributions, novelty values and implications for practice and research. Finally a conclusion is made. Paper I-III are attached as appendices.
1.0 Introduction

Improving children and young peoples' health is a significant societal challenge in both developed and developing countries. Childhood obesity has risen during the last 10 years and is associated with an increased risk of cardiovascular diseases and diabetes. Moreover, obese children tend to be more isolated and have a lower self-esteem than their peers (World Health Organisation, WHO 1998; Procter 2007).

Contemporary challenges in the domain of public health include the improvement of dietary patterns, that are founded in early childhood. Studies have shown that eating behavior tends to track into adulthood (Whitaker et al. 1997; Neumark-Sztainer et al. 2011; Nicklas 1998). Early prevention is therefore important and schools and school food systems can be considered as well-suited 'settings' for interventions that aim to counteract unhealthy eating habits, reduce inequality in health and improve students action competence (Jensen 1997; Jensen 2000; Jensen and Simovska 2005; Radcliffe 2005; Morgan and Sonnino 2008; Tones and Green 2004; Llargues Esteve 2011; Jones et al. 2012; Ruge and Mikkelsen 2013; Busch 2013; Busch 2014; Langford et al. 2014).

Schools are increasingly regarded as protected places, where young people stay for many hours. Food intake in school contributes significantly to children’s overall dietary patterns (Sanigorski et al. 2008). In developed countries of Europe and North America, obesity is the main driver for reforming school food systems, whereas in developing countries hunger and malnutrition tend to be the main driving force. Despite that the Food and Agriculture Organisation of the United Nations (FAO) emphasises the right to food as a basic human right, not much progress has been made in the 21st Century (FAO 2007). Therefore, an increasing number of intergovernmental policy documents call for action to be taken in the field of food and nutrition at school (Council of Europe 2003; WHO 2000; EU White paper, 2007; FAO 2007; WFP 2007). The call for action is supported by several studies (Morgan and Sonnino 2008; Sonnino and Ashe 2013; Foodlinks Community 2013; Perez-Rodrigo 2001).

However, healthier eating at school is not only about mere availability and the simple provision of healthy foods. Studies indicated that for a health promoting intervention to be effective, a whole school approach (WS) to healthy eating that is integrated with educational activities at school should be applied (Perez-Rodrigo 2001). This focus on the school environment takes the WHO, Ottawa Charter (1986) as a point of departure, as it initiated a shift from an individualised health promoting approach to a settings-based approach (Parsons 1996; Jensen 1997; Wyn et al. 2000; Morgan and Sonino 2008; Griebler et al. 2014; Langford et al. 2014). In the outline of a ‘School Food Revolution’ Morgan and Sonnino (2008) argued that a school meal system besides the WS approach should also include the dimensions of creative, public food procurement strategies in order to contribute to sustainable development and the re-localisation of food chains. The ‘greening’ of the State focused on four key-dimensions: the WS to healthy eating; school catering; food procurement and the supply chain (Morgan and Sonnino 2008, p.169).
Still in its infancy, a number of public schools and municipalities have adopted such a holistic strategy towards food at school and are implementing the new strategic dimensions in their school meal systems: In Europe, East Ayshire, Scotland is one of the prominent examples of re-localisation of food chains via in schools (Morgan and Sonnino 2008; Gourlay 2008; Foodlinks Community 2013). Malmö, Sweden is another example of ‘Green Public Food Procurement’ (Foodlinks Community 2013) as well as the Municipality of Fällköping (Fällköping 2014). The school Meal system in Rome is another example (Morgan and Sonnino 2008; Lôes an Nöltting 2011; Foodlinks Community 2013), together with Drome Vally in France (Lamine et al. 2012). The Brazilian ‘PNAE - National School Feeding programme’, that also has a ‘home-grown school feeding’ component (Otzu 2011), is a prominent example (WFP 2014) - as is the civil rights based ‘Bogata sin Hambre’ in Columbia (Ashe and Sonnino 2013). These kinds of integrated initiatives are believed to contribute to building new modes of coherence between local food suppliers and public schools. According to Morgan and Sonnino (2008), such holistic thinking has the potential to lead to new forms of agri-food governance, to health, sustainability and has the ability to:

“Create synergy between different public domains that are somehow related to food, including the construction of markets for sustainable, local and /or organic foods, public food procurement, educational activities, reinforcing (peri-) urban agriculture” (p.169)

In connection to this Wiskerke (2009) emphasised the need for more research to provide a better understanding of the impact of such alternative ‘food geographies’. This regarded, for instance, public health and the “interactions between regional governments, market parties and civil society organisations” (Wiskerke 2009, p. 383). Subsequent publications have contributed to this research and provided more examples of such cases (Lamine et al. 2012; Roep and Wiskerke 2014; Ashe and Sonnino 2013).

In addition to the WS and sustainability approach, some schools also apply a Health Promoting Schools (HPS) perspective. The idea is that healthy and sustainable school food is not only about the promotion of healthy eating through improved food services, but also about improving students’ active participation and their development of action competence and empowerment through learning and curricular activities. By applying a participatory approach to learning, it is assumed that students can obtain a democratic and ecologically conscious citizenship as part of their basic learning activity (Jensen 1997; James 1997; Jensen 2000; Ruge and Mikkelsen 2013; Dooris 2013). This approach gives priority to students’ participation in planning and cooking school food together with professionals (Höyrup and Nielsen 2010). The Copenhagen Food Schools and the Pacific Elementary School, LifeLab (2014) California are examples of such integrated school food approaches. Students’ participation in planning and preparing food is in these cases regarded the prerequisite for improved eating habits among children and youth.

In Denmark, one of the prominent examples of this approach is Nymarkskolen2 (NS) in Svendborg. Due to its distinct features - and with the ambitions of this research to uncover the impact of new school food approaches - it became an object for this case study. Focus was directed to students’ development of food and health-related action competence (HRAC) as learning outcomes, students’ development of healthier eating

2 NS is a public, secondary school for 620 students www.nymarkskolen-svendborg.dk
habits and the local development of sustainable public food sourcing strategies (SPFS).

The development of the first versions and sketches of LOMA at NS began in June 2011, fuelled by the regionally supported ideas of an integrated approach to health, learning and school food. In South-Denmark af Fünen, The Municipality of Svendborg and NS gradually became engaged in the development of a new concept for integrated school food called 'LOMA-Local Food' (LOMA). In a partnership with University College Lillebaelt (UCL) and Aalborg University (AAU), the school and the municipality agreed to initiate a combined development- and research project. UCL and AAU financed the research and the Municipality financed the development process. The municipality also financed expenses for food, excursions and other educational activities.

The organisational frame for this cooperation was inspired by the idea of a ‘community of practice’ (CoP), here understood as the basic building block in a social learning system for a group of people having a 'joint enterprise' and a ‘shared repertoire’ (Wenger 2000). The development process was guided by seven principles from the LOMA guidelines (table I) that the participants had agreed on. The intention was to frame the new school foodscape and to achieve a multilevel school food system that simultaneously delivered healthy food, improved students’ health-related action competence and contributed actively to the re-localisation of food chains and sustainability in the local area. The LOMA guidelines (table I) were adapted to the conditions at NS through negotiations in the LOMA-CoP. Participants, included the head master, two teachers, municipal administrative staff, local suppliers, researchers and other stakeholders. The municipal project manager led the group and the actors cooperated in a project-oriented way as a ‘community of practice’, here coined as the ‘LOMA-CoP’ (Wenger 2000; Ruge and Mikkelsen 2013). Furthermore, an action research (AR) component was included in the CoP.

Table I. LOMA guidelines (with principles) for a public school food approach that applied a whole school, health promoting and sustainable perspective.

<table>
<thead>
<tr>
<th>Nr.</th>
<th>Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Food must be made ‘from scratch’ and based on New Nordic Recommendations*4.</td>
</tr>
<tr>
<td>2</td>
<td>There must be room – a learning space - in the production kitchen for students’ participation in planning and preparations of food. Various curricular subjects are taught as an integrated part of education in the kitchen.</td>
</tr>
<tr>
<td>3</td>
<td>There must, as far as possible, be space for a common meal for both students and teachers every day. A common meal is a component in the on-going social and cultural integration at the school.</td>
</tr>
<tr>
<td>4</td>
<td>Production kitchen should be equipped professionally in order to attract and retain professional staff.</td>
</tr>
<tr>
<td>5</td>
<td>The kitchen should as far as possible include locally produced food (Preferably organic) in the menu.</td>
</tr>
<tr>
<td>6</td>
<td>The whole concept should as far as possible be sustainable in relation to working environment, lifecycle, water consumption and CO2.</td>
</tr>
<tr>
<td>7</td>
<td>LOMA can be established in existing or new buildings.</td>
</tr>
</tbody>
</table>

3 Students did not pay for food during the pilotprojects. All other days and after implementation, the parents payed for the food.

Parallel to this, a research protocol for the LOMA case study was developed and the collection of qualitative data began in November 2011. The multicomponent approach made it relevant to use the notion of ‘foodscape’ as a concept for capturing the complexity in the interactions between several heterogeneous dimensions and between human and non-human agencies in a school food system (Dolphijn 2004; Johansson et al. 2009; Mikkelsen 2011; Osowski 2012; Brembeck 2013; Mikkelsen 2014). Understanding LOMA through a framework of a holistic oriented foodscape, corresponded with the application of a case study design in the research. The developmental road, from imagining LOMA to testing and implementing LOMA, was considered to be an informative case of how healthy food production, student participation, curriculum activities and local public food sourcing strategies could become integrated in the development of a new, healthy and sustainable school foodscape.

As a consequence of this was research conducted as a single case study that applied both descriptive and explorative case study methods. A time-series analysis approach (Yin 2009) was applied as the chronological frame for the narrative that investigated how LOMA affected the participants during two-and a half years study.

The aim of this dissertation is to give an account for the case study of the LOMA, its development over time and how the LOMA foodscape influenced students, school and environment. The case study took its’ point of departure in these research questions:

“How did the LOMA school foodscape influence students’ development of food- and health related action competence (HRAC) and healthier eating habits? “

“How did the LOMA school foodscape influence the development of methods that led to sustainable, local, public food sourcing practices (SPFS)?”

2.0 Conceptual framework
In this section I will give an account for the conceptual framework of the dissertation. Besides the health promoting schools’ framework, constructivist theories of learning and alternative food geography it includes foodscape studies.

2.1 Health Promoting Schools
Theories and concepts from the health promotion schools framework (Jensen 1997; Jensen 2000; Jensen 2004; Simovsky 2005; Jensen and Simovsky 2005; Barnekow et al. 2006; Simovsky 2007; SHE 2015) constituted an important part of the conceptual framework for development, understanding, analysis and evaluation of the activities that took place at NS.

The first WHO international conference on Health Promotion in 1986 served as point of departure for the HPS network. Here, the principle for a settings-based approach to health promotion was formulated in the Ottawa charter. Thereby focus shifted from an individualised concept to a place and context-bound perspective for health promotion:
Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy life-styles to wellbeing” (WHO 1986).

This statement was further developed at subsequent WHO conferences aiming at adjustments of definitions and recommendations to the challenges of contemporary society. On the first conference in the European Network of Health Promoting Schools the notions of ‘empowerment’ and ‘action competence’ were included in the conference resolution (WHO 1997). During the next years a network of Health Promoting schools gradually evolved (Tones and Green 2004; Langford et al. 2014).

In the Scandinavian network of HPS the notions of participation and action competence were emphasized as part of a democratic educational oriented approach, that aimed at developing the ability to influence one’s own life and society (Jensen 1997; Jensen 2000; Jensen and Simovska 2005; Tones and Green 2004; Carlsson and Simovska 2012). The key components of action competence are: Insight and knowledge, commitment, motivation, vision, experience, social and practical skills (Jensen 2000; Jensen and Simovska 2005). Closely related to participation and action competence is the IVAC model for monitoring students’ involvement and influence (Jensen and Simovska 2005). Studies and systematic reviews regarding outcomes of HPS initiatives demonstrated that students’ active participation was an important element in student’s development of HRAC (Jensen and Simovska et al 2005, Griebler et al. 2014, Langford et al. 2014).

The IVAC model (see table II) was included in the Danish National Guidelines for the subject of Health Education (Ministry of Education 2009 and 2015). IVAC served as point of departure for the educational LOMA activities that were organized by teachers and the LOMA-CoP. It was consequently applied as one of the methods to monitor students’ work, participation and influence in the LOMA educational activities. The IVAC model also served as a tool for defining indicators of food and HRAC as learning outcomes (See more in Paper II). In order to adapt to the needs and expectations of current educational systems - including the call for more evidence based development of educational programs - an ‘E’ for evaluation was added so that the ‘IVACE’ model applied in this dissertation is thus a 2nd generation.

The first dimension of the model is formed by four distinct phases that students work through in a typical action-oriented school health promotion project: Investigation, Vision, Action, Change and Evaluation. A number of questions are connected to each phase such as:

- Why is this theme important for us? - Are there any alternatives?, - What actions and change can bring us closer to our vision?

The other dimension of the IVACE model is constituted by four forms of participation that reflect fundamental questions about power relations between students and professionals:

- Who takes the initiative? And - Who is involved in the final decisions?
The IVACE model as a matrix for analysing student involvement according to participation (vertical axis) and phases in a school health initiative (horizontal axis). Inspired by Jensen and Simovska (2005).

<table>
<thead>
<tr>
<th>Forms of participation (involvement and influence)</th>
<th>Investigation</th>
<th>Vision</th>
<th>Action and Change</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I</td>
<td>V</td>
<td>A &amp; C</td>
<td>E</td>
</tr>
<tr>
<td>4. Students’ initiative (common dialogue and decision-making with teacher)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Students’ initiative (students’ decide)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Teacher initiative (common decisions)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Teacher initiative (teacher decides)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The IVAC model was developed and tested in the European network of Health Promoting schools and the guiding principle was to support students’ development of a democratic citizenship (Jensen 1997, Jensen 2000, Jensen and Simovska 2005). The evaluation stage in the model covers students’ production of assignments as a tool for them to synthesize, often complex, information and experience through personal work. It also includes teachers’ evaluation of students work. For further insight in the application of IVACE and the HPS framework in LOMA - and measurement of outcomes - see Paper II and Paper III.

In the current study was food regarded as one of the social factors that determine health (cf. WHO 2007; WHO 2008) and awareness was raised towards the current ‘nutrition transition’ (Popkin 1993) and how this transition affected the health of children and youth and how the it was socially patterned (Hawkes 2007).

In a HPS perspective the relation between food and health was defined in the document ‘Healthy Nutrition: An Essential element of Health-Promoting School’, published by WHO, FAO and Education International (WHO 1998). This document stated that education and food were fundamental conditions for health. Moreover, that health, education and nutrition supported and enhanced each other, because nutrition was regarded as an essential element:

“To increase the health and learning potential of students, families and other community members “ (WHO 1998).

Subsequent WHO documents on health and nutrition served as a framework for the promotion of healthy nutrition at schools by helping actors to: Create healthy public policy, develop supportive environments, reorient health services, develop personal skills and mobilize community action. (WHO 1998; WHO 2006; WHO Europe 2008). In the light of the rising challenges with childhood obesity a group of European scholars called for an improved overview regarding schools as a setting for implementation of dietary guidelines (Perez-Rodrigues et al. 2001). This was also a call for a more evidence based knowledge for actions taken and an export forum from both HPS, WHO and the European Network of Public Health Nutrition was established. In 2005 the EU Commission adapted
a resolution aiming at the improvement of healthy nutrition in schools and the application of a whole-school (WS) approach that integrated healthy eating with school curriculum (Council of EU 2005). In 2015, the SHE network (SHE 2015) defined the whole-school approach to health promotion by six elements that focus on: Healthy school policies (including food policies), school physical environment, school social environment, individual health skills and action competencies, community links, health services. Food and nutrition could be included in each of these elements according the health challenges, as exemplified by for instance the Utrecht Healthy School Project (Busch 2013 and 2014).

In a HPS approach students’ wellbeing was regarded as an essential objective. In accordance with this, Lindström and Erikson suggested, that salutogenesis should be implemented in educational science, combined with the notion of action competence (Lindström and Eriksson 2011). They regarded the result of this as a possible theory of ‘healthy learning’ that with advantage could be applied in educational settings such as schools. The salutogenetic approach is based on the notion of Sense of Coherence (SOC) coined by Antonovsky (1993), who focused on mechanisms that kept people healthy, regardless of eventual ‘stressors’. His research gave evidence to believe, that three components shaped a salutogenic approach in health promotion: Comprehensibility, manageability and meaningfulness. When these components were combined they provided people with a reassuring sense of coherence (SOC) contributing to ‘staying’ healthy. In this perspective, the LOMA intervention focused on students in the healthy end of the ‘health-continuum’ (Antonovsky 1993). Based on these considerations SOC is included as a supplementary outcome measure, closely related to the cognitive, emotional and socio-societal learning outcomes.

2.2. Students’ learning and identity
When students participated in LOMA they were supposed to achieve prescribed learning goals at secondary level, while they were also developing food and health-related action competences (HRAC). The components in this kind of learning and action competence included knowledge about food, cooperation experience, cooking skills, ownership, motivation, commitment and critical thinking. The emphasize on ‘action’ in relation to learning and achievement of competence, meant that promotion of healthy eating at school was not regarded as passive provision of food. Rather, students’ active participation in planning, preparing and serving school food constituted a basic principle (cf. table I). Moreover, students had the possibility of influencing central parts of the educational activities.

In addition to the HPS framework, the study of LOMA applied scientific knowledge about the complex relation between young peoples’ learning and identity work. This was a consequence of the holistic approach in the LOMA foodscape. These theories took a constructionist point of departure, which in this dissertation was represented by Illeris’ theory about young peoples learning and self-orientation (Illeris 2003) and Ziehe’s theories about ‘normal learning problems’ among youth (Ziehe 2009). According to Illeris, learning will always include the integrated, cognitive, emotional and socio-societal dimensions:

“Through the cognitive dimension, knowledge, skills, understandings and ultimately, meaning and functionality are developed. Patterns of emotion and motivation, attitudes
and ultimately sensitivity are developed through the emotional dimension. Through the social-societal dimension, potentials for empathy, communication and cooperation and ultimately sociality are developed” (Illeris 2003, p.3).

Illeris illustrated this by a dynamic learning triangle (Illeris 2003, p. 4) that drew on Piaget’s theory of cumulative, assimilative and accommodative learning processes. Accordingly, the most common form of learning for youth in schools would be accommodative, as the basic mental schemes and patterns have been established in earlier childhood. Moreover, young peoples formation of identity was regarded as integrated in all processes of learning Illeris (2003).

This approach was useful for understanding the complex learning and identity building processes that the young people went through – and expressed - when they participated in LOMA. For me as a researcher, it made sense to look at students' development of food and HRAC in the light of this framework. Accordingly food and HRAC components such as knowledge, insight and skills were situated in the cognitive dimension and components such as motivation, empowerment and attitude were situated in the emotional dimension. The third socio-societal dimension, encompassed students' development of empathy, collaboration and communication developed through the interaction processes. See fig. I for illustration of these relations:

**Fig 1.** Three dimensions of young peoples’ learning and the position of identity (After Illeris 2009, Ruge 2015).
In relation to the triangle of learning and identity, Illeris stated:

"Identity formation can therefore in general be described as a holistic learning process that in a significant manner includes and influences the whole field of learning" (Illeris 2003, p.12)

Consequently, as defined by Lave and Wenger (1991), students' learning and identity building should be regarded as 'situated' and contextualised with reference to the social dimensions and in accordance with Ziehe (2009) also with reference to their horizons regarding food and health. For the purpose of subsequent analysis and understanding, I here include a summary of how Ziehe accounted for the ongoing de-traditionalisation that has characterised western societies since the 1970's. Ziehe argued that modern life-styles were defined by a 'popularisation' of all cultural domains in society and accordingly, the impact of an 'omnipresent pop-culture' has invaded the educational sector. The positive impact of this was, according to Ziehe, an increased measure of motivational liberty: “The necessity of choosing for one’s self, has become part of everyday life” (p. 189).

However “the modern mental self-reference means letting all expectations of and requests from the outside world pass through a ‘subjective filter’” (p. 190). In this perspective, Ziehe argued that identity is then primarily constituted by one’s own self-images, which emphasises ‘internal conflicts’ and dependence on the recognition of others and on the social relations to others. This can cause ‘identity pain’. Ziehe concluded, that these dynamics were causing “ever-increasing problems for schools in their current endeavours to cultivate learning styles” (p. 191). The effects of this were evident by young peoples' behaviour, which Ziehe regarded as 'informalized and unstructured' - expanding both to the class room and to the internal personal conditions. Also, the modes of young peoples' individual attention has become fragmented and accelerated, which implied a 'habituation' to “interruptions, dissolving and huddling together of moments, and at the same time also an inclination to sudden reversals into boredom and loathing”.

However, of special interest for the study of LOMA, Ziehe argued that there were indications of a 'post-de-traditionalization', where he identified young peoples’ 'counter-desires’ for stable relations, integration, support, community, normative clarity and fixed boundaries (p. 196). This argument corresponded with the findings in current study of how students seemed to approve a lot of the implication of more structure and community – despite of what adults often expect from young people. Furthermore, Ziehe suggested, that more attention should be directed to the ‘setting’ of learning processes in order to provide not only regulating functions but also supporting, meaning-generating and expressive impact (p.198): “A setting can contain supporting rituals of recognition of formal and personal differences between the persons who are involved /.../it can contain ego-supporting borderlines and in this way promote self-reassurance, rule observance and relief of ambivalences”(p. 198). In this study, the following account for students’ development of food and HRAC will refer to Ziehe’s account, especially in the analysis of 9th grade students actions and utterances, but also in the final discussion of the findings.
In conclusion, I applied a multi-component conceptual framework to study students’ development of food and HRAC in the complex, multi-level LOMA foodscape. Design of measurement of students’ learning outcomes and the interpretation of these data took the point of departure in an integrated platform of:

- Food and child studies (Brembeck 2009; Johannsson et al. 2009; Mikkelsen 2011; Ruge and Mikkelsen 2013).
- Youth, education and learning studies (Erikson 1971; Illeris 2003; 2013; Ziehe 2009)

2.3 Community of practice - the LOMA CoP
In the study of LOMA I applied the theory of ‘communities of practice’ (Wenger 2000) in order to capture the mixed nature of the LOMA project group, where people shared the same ideas, aims and repertoires. The participants included two teachers, headmaster, department manager, administrative staff and a representative from the Department of Health. At some points, during for instance joint planning meetings (1-2 times a month), employees from other departments were included. The group was led by the municipal project manager from Department of Children and Youth. It was established with the aim of developing and implementing LOMA at the school within a certain timeline (cf. table III) based on the LOMA guidelines (table I). The group applied a local perspective on cooking, learning, health promotion and public food procurement.

Situated, social learning processes (Lave 2009) characterized the project group - or the ‘LOMA-CoP’. The aim was to facilitate change processes and to improve the real-world situation at the school.

The partners involved in LOMA agreed, that I as the researcher was included in the CoP and as a PhD candidate I represented the AAU/UCL research group. This facilitated immediate transfer of previous theoretical knowledge to the LOMA-CoP and immediate feedback from ‘practitioners’ and eventually subsequent adjustments. In addition, this position provided me with a platform for studying the processes from ‘within’ and to get a better understanding of actors and dynamics.

Furthermore, an action research (AR) system was established within the CoP, consisting of the teachers and me as a researcher. The AR system primarily focused on issues regarding student's learning and opinions and the associated development and test of adequate pedagogical methods (more about AR in 3.2).

The integrated development- and implementation process in the LOMA-CoP turned out to be not just a linear route, rather a journey of learning cycles. Often the capacity regarding knowledge and experience was challenged in the LOMA-CoP and adjustments had to be made through dialogue and negotiations. In these situations the LOMA guidelines turned out to be a useful tool for refreshing both the objectives and the frame. Furthermore, the guidelines facilitated, that participants found a way to reach a common agreement. In order to support the CoP, more persons were included during certain stages, e.g. architects during re-building and head of a local farmers association regarding issues of public food procurement. From time to time, the latent power structure was activated, for instance when decisions had to be made within a certain deadline. This meant that the project manager (referring to the CEO in Department of Children and Youth in the
Municipality) made the final decision, even if full agreement was not obtained within the LOMA CoP.

The function and legitimacy of the CoP was gradually reduced as a logic consequence of the implementation of LOMA in the everyday-life at school by October 2014 (see table III). This made sense in terms of the implementation of the practical procedures and the sustainable public food procurement practices. However, in terms of the integration of LOMA activities in curriculum, this turned out to be a longer process of transformation and social learning. This process continued during the following school year (2014-2015) influenced by the new demands of the 2014 reform of the Danish ‘Folkeskole’ (Danish Ministry of Education 2015).

2.4 Alternative Food Geography

Another central pillar in the conceptual framework for the study of LOMA focused on the re-localisation of food chains as an element in public food procurement and an ‘alternative food geography’ (Wiskerke 2009). By including ‘local food as far as possible’ in the LOMA charter, it was intended to secure a different trajectory from what was mostly seen in contemporary public food procurement in Denmark, where large wholesalers were the sole suppliers of public food (Ruge and Mikkelsen 2012). Inspired by the concept of re-localisation of food chains (Morgan and Morley 2002) and the call for a ‘School Food Revolution’ (Morgan and Sonnino 2008), the LOMA-CoP believed that a Danish school meal system could also contribute to regional and sustainable development. The LOMA concept aspired to be an example of how this could be accomplished in a Danish context, where there were no National School Food program and changes therefore often conducted at the local, municipal level (Sabinsky et al 2011).

Even if the concepts of re-localisation are often presented as logic and appear to be obvious, the trajectory is often not a simple one to follow, because these processes of change must take a number of issues into consideration, for instance: Issues of power and stakeholder interests, staff capacity, public health policy and EU regulations. Studies of food and farming systems and the dominant conventional, agri-industrial paradigm (hypermodern food geography) have also accounted for the dynamics of the ‘Alternative Food Geography’ and provided an improved insight into the challenges for public food governance (Wiskerke 2009; Lamine et. al 2012; Ashe and Sonnino 2013). A model of the alternative, territorial mode of agri-food governance’ has been suggested (fig. 1) as a way to illustrate the dynamics between market, state and civil society.
The model that is illustrated in fig. 1 highlights the idea that:

“Food becomes the thematic integrative meeting point for various policy concerns and the role of state, marked and civil society is transformed” (Lamine et al. p.251).

According to Morgan and Sonnino (2008), governments, municipalities and public schools have the potential to deliver health and sustainability objectives in addition to enhancing regional employment in the food sector. In the light of the model for integrated and territorial mode of agri-food governance, LOMA was placed on the ‘state-market’ axis as a public food procurement initiative. Furthermore, in this position was LOMA integrated with the strategic level on the ‘state-civil society’ axis, because the system involved the integration of school-, health- and education policy. It also involved support from citizens such as farmers, wholesalers, teachers, kitchen workers and health staff.

In the LOMA case the municipal council was the primary agency for agri-food governance and school food was placed as the thematic, integrative meeting-point (the small ‘food’ circle in the middle of fig.1) for a number of food-related policy areas such as school meals, education policy, curriculum for school subjects, ‘quality of life’ at the school, sustainability - and public health. Following this, food in schools was very much a public health issue and therefore the territorial modes of agri-food governance could be seen as nested within a larger ecological public health model, which takes the mixed nature of contemporary societal challenges into consideration.

A comprehensive ‘Ecological Public Health’ model was suggested by Lang and Rayner that comprised material, biological, cultural and social dimensions. (Lang 2009; Rayner and Lang 2012). This multi-level model illustrated the transitions between the four dimensions and how human health and eco-systems’ health were subsequently
determined and interrelated. According to Rayner, this model could be used as a 'lens' for understanding the societal interplays regarding public health, food and sustainability.

In this case study, the notion of a territorial mode of agri-food governance contributed to the understanding of the local public food procurement part of LOMA in particular. Furthermore, it facilitated an understanding of LOMA at situated in a larger ecological public health perspective. These theories offered dynamic models for understanding, analysing and monitoring interventions, such as LOMA, that aim at improving contemporary, unsustainable food, public health and ecological systems.

2.5 Foodscape studies
The central message in the LOMA guidelines was that food at school was not only about the provision of food. Food at school also concerned the creation of a space that encompassed all the different aspects related to food, including the opportunities for learning, active participation and healthy living. In addition to this, the personal development and identity work of children must be included (cf. Illeris 2003; Dryden et al. 2009). In this dissertation concepts from foodscape studies provided a method for understanding that a space for food at school was not a simple system, but rather a complex ever-dynamic social system, with inbuilt structures and agencies that all contributed to the shaping of food and HRAC among young people at school.

The foodscape approach took its conceptual starting point in the work of anthropologist Appadurai (1996), who suggested an elementary framework for exploring the global flows of culture and argued: “The suffix–scape allows us to point to the fluid, irregular shapes of these landscapes”. Inspired by Appadurai, other scholars drew on both systems thinking, sociological and geographic literature (Johnston 2009) when they used the term 'foodscape': “To describe spatial distribution of food across (spaces) and institutional settings” (Roep and Wiskerke 2012). Influenced by linguistic and ethnographic theory, the Dutch anthropologist and philosopher, Rick Dolphijn went beyond the physical appearance and emphasised how foodscape came into being:

“Foodscapes are how food functions in immanent structures that are always in a process of change, how food affects and is affected, how we live our lives with food, according to food and through food” (Rick Dolphijn 2004).

These structures functioned in institutional foodscape such as schools, kindergartens and hospitals that were assumed to be of special dietary importance, due to the high frequency of eating taking place in these places (Sanigorski et al.). Moreover, they were also sometimes perceived as ‘captive’ or ‘protected’ because individuals were forced to eat there, to some extent. According to Mikkelsen, institutional foodscape could be defined as:

“The physical, organizational and sociocultural space in which clients/guests encounter meals, food and food related messages including health messages” (Mikkelsen 2011).

Other food researchers, became inspired by the space thinking and demonstrated how the notion of foodscape could be applied particularly to facilitate the analysis and understanding of children’s foodscape at school (Johansson et al. 2009; Osowski et al.)
Mikkelsen’s definition of the institutional school foodscape provided a useful concept for understanding the diverse food realities at school. In the school meal, objects such as tables, chairs, plates, aprons, the carrot and the potato belonged to the physical space. The act of buying and serving food belonged to the organisational space. Students’ learning, identity formation and the traditions at school belonged to the socio-cultural space. However – most importantly – all three spaces were simultaneously present in each event (cf. Dolphijn 2004). Foodscape studies (Johansson 2009; Brembeck 2012; Brembeck 2013) indicate that the subject, the ‘I’, seems to integrate these spaces in talk and thought - in a personalised foodscape, in discourse. Those studies served as useful points of reference for the study of how the LOMA foodscape affected young people in schools and how they lived with and learned ‘through’ food. Building on Mikkelsen’s definition (Mikkelsen 2011; Mikkelsen 2014) and adapting it to the special requests of an integrated school setting, I will use the following heuristic as a definition in this dissertation:

“The integrated school foodscape is the physical, organizational and sociocultural space in which students participate in meals, cooking, food related curriculum and encounter food messages - including health and sustainability messages” (Ruge 2015)

The spatial understanding of LOMA through this ‘looking glass’ of an integrated school foodscape corresponded with the application of a case study research design. I will elaborate this in the following section.

In summary, the conceptual framework in the case study of the multicomponent LOMA foodscape included theories of HPS, students’ learning and identity, communities of practice, alternative food geography and foodscape studies. This framework facilitated the analysis and understanding of the development and implementation of LOMA at the level of local society, school, teachers and students.

3.0 Methods

3.1 Case study
The LOMA programme constituted a case of how healthy food production, student participation, health education, curriculum activities and local public food sourcing strategies could be integrated in a school foodscape. In order to capture the complexity of such a development process, research was organised as a single case study that combined descriptive and explorative case study methods (Bassey 1999; Yin 2004; Yin 2009). Research was undertaken as a single case study of the development and implementation of an integrated education and health program called LOMA-Local Food (LOMA) in a secondary school in Denmark.

The application of the case study method was grounded in the basic assumption that complexity should be matched by a social inquiry. An inquiry that applied integrated
methods in order to produce knowledge about solutions that constructively related to the challenges. This approach approximated the concept of social science as 'applied phronesis':

'Practical wisdom on how to address and act on social problems in a certain context' (Flyvbjerg 2012).

For this purpose, the case study method was regarded as well suited for context-sensitive social science research that used a diversity of quantitative and qualitative data collection methods (Flyvbjerg and Schram 2012). The case study design made it possible to use the basic questions for a critical social inquiry as a underlying guideline: 1) Where are we going? 2) Who gains and who loses, and by which mechanisms of power? 3) Is it desirable? and 4) What should be done? (Flyvbjerg 2001).

In this sense, the aim of the current interdisciplinary study of an integrated school foodscape was also to 'make social science matter' (Flyvbjerg 2001) in the hope that the insights would benefit the on-going efforts to create a more democratic and ecologically healthy society. The implications of this approach will be discussed in the discussion part of the dissertation. The evaluation of the development and implementation of LOMA at NS applied theories of 'realist evaluation' (Pawson and Tilley 1998; Tones and Green 2004). The basic notion of this was expressed in the formula:

Mechanisms + context = outcome (CMO).

The equation pointed to the need for a focus on context:

“Evaluators need to acknowledge that programmes are implemented in a changing and permeable social world and that programme effectiveness may thus be subverted or enhanced through the unanticipated intrusion of new contexts and new causal powers” (Pawson and Tilley 1998).

Besides the context-based approach, the principal analytical method in this study had a hermeneutic point of departure in the interpretation and analysis of qualitative data (Giddens 1979; Tones and Green 2004). Sources of evidence were observations, documents, and semi-structured interviews (Kvale 2007). Ethnographic methods were applied via video footage and photo (Pink 2013).

Data that included students as respondents was treated anonymously and other kinds of respondents gave written consent to the use of eventual non-anonymous quotation in the scientific work. Key-persons from NS read manuscripts for papers in order to confirm the course of action and the general interpretation of the events. According to the realist evaluation methods, triangulation of data was used as a complementary strategy in order to get a wider picture of the changes and the events. As a supplement to qualitative methods (Yin 2009; Bassey 1999) quantitative methods were applied in the form of a quasi-experimental, small sample, intervention study (QEIS) of two 9th grade classes.
3.1.1. Time-series analysis
For this dissertation, a time-series analysis was applied as a frame for studying the causal relations between the subsequent stages of the development project in the case (Yin 2004; Yin 2009). The chronological perspective provided a logical structure, where the process fell into three parts: 1. Imagined, 2. Exploratory and 3. Implemented. See table III.

Table III. Overview of time, activities and data collection (Ruge 2015).

<table>
<thead>
<tr>
<th>Time</th>
<th>Stage of LOMA school foodscape:</th>
<th>Activity: Municipal administration</th>
<th>Activity: School administration and practice</th>
<th>Data Collection: Qualitative and quantitative methods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Implementation of policy, Nymarkskolen (NS) as secondary school.</td>
<td>Community of Practice: ‘LOMA-CoP’.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sustainable, public Food Procurement.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>'Two-week, Health and Math project for 9th grade’. Action research.</td>
<td></td>
<td>Quasi-experimental intervention study in 9th grade (quantitative)</td>
</tr>
</tbody>
</table>

QEIS was conducted in connection with the implementation stage of LOMA in 2013 (cf. table III). It was embedded in the total case study that was primarily based on qualitative data. Statistical methods were applied in the analysis of survey data from the online questionnaire. By embedding a QEIS, the case study applied a mixed-methods evaluation design, where complementary data was collected (Yin 2009, p.62; Pommier 2010). Input, output and outcomes were displayed in order to account for CMO in a comprehensive way. This facilitated a ‘richer picture’ of the process and the impact from contextual factors (Cooksey et al. 2000; Yin 2009). Displays were placed by the end of the description of each stage 1, 2 and 3 in this dissertation.

3.2. Action research approach
The aspiration to acquire knowledge about a ‘real-world situation’ by the case study method was combined with an action research (AR) approach (Checkland and Holwell 2007). AR constituted an important sub-system in the LOMA-CoP that managed the development and implementation processes. Action research was organized in a way that encompassed the following elements:
• A collaborative process between researcher and people in the situation
• A process of critical inquiry
• A focus on social practice and
• A deliberate process of reflective learning

(cf. Checkland 2007)

With reference to Checklands’ cycle of action research, AR participants shared a framework of ideas (F), that were used in a methodology (M) to investigate the area of interest (A). This took place during cyclic processes, where ideas were tested in real-life, adjusted and then tested again (see fig. II).

**Fig. II. The action research cycle in the LOMA-CoP** (Ruge 2015, after Checkland and Holwell 2007, p. 9). F= Framework of ideas, M= methodology, A=Area of interest.

The overall area of interest (A) for the LOMA CoP was development and implementation of LOMA at the school. Closely connected to this was the interest in students’ development of food and HRAC as learning outcomes. Especially, this area became an object for AR and before actions were initiated, the headmaster, teachers and myself as the researcher agreed on the framework of ideas (F) and the kind of knowledge that was regarded as valid in the action research approach (cf. 2006). We gave priority to HPS methodology and associated knowledge about students’ development of components of food and health related action competence. This was
decided with reference to the guidelines for health education at secondary level (Danish Ministry of Education 2009), the health promoting schools conceptual framework (SHE, 2015; Langford, 2014) including the IVACE approach (Jensen and Simovska 2005; Simovska et al. 2006). At certain occasions, for instance during the pilot projects, I organized collaborative collection of data (teachers taking notes, video, photo). Subsequently, analysis and discussions were carried out and shared with the larger group of persons in the LOMA-CoP and among the whole teacher staff at NS (see fig. II).

Even though focus was on educational practice (A), the AR system also investigated theoretical and methodological issues regarding health education and learning in general. Members, for instance, participated in an on-going critical dialogue about e.g. the use of quantitative and qualitative methods and triangulation in relation to validity and reliability (cf. Denscombe 2008). Knowledge was shared among participants immediately, for instance among the teacher-teams who were responsible for the conduction of pilot projects (cf. table III). The aim of the AR system was also to facilitate shared learning from the ‘real-school situation’ on how to apply LOMA in educational practice. From the beginning of 2012 till the end of 2013, the AR participants, together with teacher teams, initiated practical actions in the form of hands-on, cooking and meal-activities as integrated in subjects of home economics, health, science and media during pilot projects (LP6, LP7, LP8). Furthermore, they collaborated on evaluation due to their interest in the indications of how the program affected students’ health, wellbeing and learning.

### 3.3 Methods, findings and evidence

When I participated in the LOMA-CoP I intended to maintain a double cyclic perspective (A): the interest in the concrete implementation and the interest in getting answers to research questions regarding students’ development of food and HRAC. The results of the latter were the findings that I shared with the LOMA-CoP and other pedagogical staff. Furthermore, findings were disseminated at seminars, in papers and journals. At more than one occasion participants from the AR system attended a conference for joint presentations and workshops (e.g. Ruge and Jensen 2013).

Both teachers and students became familiar with me as ’the researcher‘ due to the frequent visits and interviews during the two and half years, where the systemic change was conducted at the school. However, the combination of case study method and the AR approach made it necessary for me to be able to change between the ’cooperative’ and the ’observant’ position. Video footage of meetings helped me to keep the double perspective. I was aware of the risk, that the case study findings could be biased from the close cooperation with teachers, but I tried to counter this through critical dialogue in the CoP and with senior colleagues at AAU and UCL.

An example of this was an on-going discussion about qualitative and quantitative research methods in relation to validity and reliability of the findings. This had an impact on my decision to embed a smaller, quasi-experimental intervention study of a two-week LOMA intervention (LOMA-13) in the implementation stage of the case study based on quantitative methods. The application of a mixed methods approach reflected an aim of providing complementary data to support for the findings in the qualitative part of the case study. In the daily AR work we applied methods from soft systems thinking (Checkland et al. 2000) that included ‘bubble’ drawings as a way to display spaces, things, forms of participation, rules, problems to be solved and persons in one coherent picture. This method was especially suited for pointing to the boundaries between systems or
sub-systems. One of the strengths of this method appeared to be, that it supported social learning processes and facilitated the development of a shared understanding, where teachers participated in the drawing-process after having received a basic instruction.

My objective with the selected research methods – case study and AR – was not to conclude on the replicability or the generalization of the findings. However, it was my intention to provide evidence for the ‘recoverability’ of the case study (cf. Checkland and Holwell 2007; Baskerville 1996). Also, it was my aim to disseminate the study in a way that was transparent and offered parties of interest with an insight in how the research was conducted. This issue was also relevant in relation to continuation and transferability, e.g. regarding to the interest that other schools began to show for implementation of LOMA.

4.0 The LOMA foodscape journey.

In the following section I will use the metaphor of a ‘foodscape journey’ as a way to present results from the two and a half year case study. It is a journey through smooth and striated spaces (Dolphijn 2004) and through time: From the imagined LOMA foodscape, to the exploratory foodscape and finally the implemented LOMA foodscape. Systemic change took place in both the physical, organisational and socio-cultural spaces. It involved many different participants: Project manager, head master, students, teachers, local suppliers, researchers and administrative staff. During the journey of the three stages of development my intention was to illuminate the mechanisms that led to students’ development of food and HRAC as learning outcomes, healthier eating habits and the local development of SPFS.

In paper II and III the focus is directed to the study of students’ perceptions, experiences and understandings. In order to supplement this and provide a broader picture of agency in this dissertation I will here include quotes from adult key-persons in the introduction of each stage:

- The project manager (1. Imagined)
- The head master (2. Exploratory)
- The coordinating teacher (3. Implemented)

I have selected these persons among a larger group of dedicated people in the LOMA-CoP, because they had a major role in guiding, connecting and leading processes and participants. Due to the interviews, that I conducted with these people approximately every third month, I became familiar with their way of thinking and acting as educational professionals. This was very helpful for me, as I learned a lot about NS as a public organisation in processes of ‘change’, which I had never disclosed on my own.
4.1. The imagined LOMA school foodscape (2011)

“First of all, it was actually a really good thing that it was announced that now there is a project manager. Now there are some expectations, which I must fulfil in terms of being a project manager for the LOMA project, as we still call it, and that is to ensure that there is a coordination between the department of Children and Youth, Culture and Planning, Health and Prevention, because there are actually three executive areas involved, if we can put it that way.”

Interview with the project manager, Department of Children and Youth.

This section concerned the first stages of the LOMA foodscape, where joint efforts were made in order to obtain a school food ‘bridgehead’ within a municipal, democratic system in transition. A most important actor at this stage was the project manager, who therefore got the introductory remark in this section. As a municipal employee in the Department of children and Youth, she had the task of connecting internal and external participants and to get the school food project on track. The function of ‘project manager’ called for experience, overview and communication abilities. It turned out to be of utmost importance for the project that the project manager possessed these qualities. At the point when the above statement was made, she was focused on the internal challenges to ensure that there was a coordination between the departments of ‘Children and Youth’, ‘Culture and Planning’, and ‘Health and Prevention’.

At the start of the process in 2011, the imagined LOMA foodscape only consisted of some words, intentions, needs, emotions, thoughts, visions, power points and notes. During several joint meetings in the project group or LOMA CoP, these components were negotiated and a shared meaningfulness and understanding of the implications of this was obtained. These components were gathered to produce a complete project with aims, reasons, time-schedules and costs. In a foodscape perspective, the organisational space was predominant during fall 2011 and spring 2012. Strongly affected by municipal policy, action plans and dependent on support from the Local Council and the Mayor.

At that time, the Nymarkskolen (NS) school foodscape resembled most other Danish secondary schools. In the physical space, students either brought a packed lunch from home, a sandwich from the school booth or they simply skipped lunch (cf. Sabinsky et al. 2010). Students were allowed to leave school during break at secondary level and some of them bought ‘competitive food’ in local supermarkets or service stations. Food was eaten either in the classroom, in corridors, in the yard or on the road from the supermarket and back to school.

The National Health Profile on Youth (Danish Health and Medicine 2011) indicated that such unhealthy eating behaviours contributed to the increasing rates of obesity and malnutrition among youth. In Svendborg the municipal report ETOS of health among youth (Svendborg Municipality 2011) indicated similar challenges for youth in the region. In order to promote health, the Municipality of Svendborg considered the potential for development of a more healthy school meal system at NS as a means to address these challenges.
In addition to this, effects of regional marginalisation created a demand on new solutions and decisions. These decisions were taken by prominent public actors, such as local politicians from the Committee of Children and Youth, the CEO of administration in the Department of Children & Youth and the headmasters of the schools. A decline in the number of pupils in the area constituted a need for change in the municipal school structure, including a reduction in the number of schools. Before the change was initiated, the school had another name and was a primary school, situated in an area where most families were economically disadvantaged and had other ethnic backgrounds than ethnic Danish. In order to counter effects of this situation for children in the area, the municipal council decided to turn the school into a school for secondary students from the whole municipality – including the ‘better of’ areas. The smaller pupils changed to another school in a more rural area in the municipality.

In this rupture of old habits and traditions in the ‘municipal schoolscape’ there was room for change, social innovation and also for a ‘quality turn’ (cf. Ashe and Sonnino 2013). It was possible to make an exception and to take an innovative approach to food, health and learning at secondary level at NS. In this ‘open window’ the objectives and the guidelines for the LOMA approach (table I) were introduced by a research team from UCL and AAU5, who also suggested a research component with the aim of initiating an AR process together with teachers. Research was supposed to result in a useful report on achieved outcomes in relation to students’ development of food and HRAC and the local development of sustainable public food sourcing strategies.

After the initial meetings, the formal LOMA partnership, the project group and the steering-group were established in 2011. The project manager was responsible for development and implementation processes. In order to operationalize this she included a larger group of people in the work. This group worked as a community of practice that shared ideas, visions and repertoires - the LOMA-CoP.

The new headmaster at the school also supported the option for an innovative school meal system. She initiated - and later led - the reconstruction and physical rebuilding of the old school in collaboration with administrative staff. As an element in this kind of systemic change (Bassey 1999; Yin 2009) she imagined the same qualities as for a Danish continuation school, “except for the beds”6. The implication of this vision was that she intended to have a production kitchen in the school. A kitchen, where students participated in cooking school food every day and where there was also a dining hall for eating the food. In November 2011 the headmaster formulated her expectations:

“I expect that we will create a meal scheme which is not just a meal scheme, but much more than that. I expect that the project will strengthen young people’s health through better conditions for teaching and how to make healthy choices. I also expect that through the project we will achieve a positive and strong profile of the school as a place where professional and interdisciplinary education, welfare and community come together in a higher unity. Finally, I expect that the project provides increased opportunities to see connections between theory and practice and thus increase the number of students who sense and feel motivated (of more of) what is going on in the school.” Interview with headmaster, 2011.

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6 Many Danish students go for a one-year stay at a continuation school for 8th or 9th grade.
This quote from the headmaster was an example of how food and health discourses were intertwined in the socio-cultural space: The headmaster pointed to an integrated space, a thematic meeting point (cf. Lamine et al. 2012), for at least two policy concerns: policy for ‘improved learning’ and policy for ‘health and students’ healthy choices’. In addition to this she also expressed a wish for the school to become recognized for innovation and professionalism as an aspiration that belonged to the discursive order of school ‘public relations’. Last but not least, the headmaster expected students to ‘get more meaning’ out of going to school through an improved connection between theory and practice. This expectation provided the LOMA project with a ‘salutogenic’ (cf. Antonovsky 1993) orientation that was supported at management level. Eating food for nutritional purpose was here almost a subordinate component - even if observations from teachers and the first pilot project indicated that 10-15% of the students did not eat food at all during school (see Paper III). Later in the process, as a result of both the reflection-cycles in the AR-system, the practical work and the close coordination between project manager and head master, these aspects were gradually elaborated and included.

In the socio-cultural space, another very important group of agents also expressed themselves at 1st stage of the LOMA school foodscape: The teachers of Home Economics, among whom some had previously pointed to the possible benefits of a school meal system for the improvement of students’ learning at NS. A representative for this group responded to the headmaster’s inquiry for interested teachers and she became a participant in the project-group or LOMA CoP that was established. She gradually became a key-coordinator of the new LOMA school foodscape at NS. Also, a science teacher, who raised awareness of possible learning benefits from cross-curricular science education in the LOMA foodscape, was included in the CoP. Their participation was facilitated by extra hours or by inclusion of temps. These two teachers were key actors in the development of pilot projects, which will be described in the following section. Students were not involved in the activities at the first stages of the LOMA foodscape, therefore there no outcomes were registered in this category. Table IV provided an overview of outputs and outcomes from this stage.

**Table IV. Summary of output and immediate outcomes food and health-related action competence (HRAC) and sustainable public food sourcing strategies (SPFS).**

<table>
<thead>
<tr>
<th>Output</th>
<th>Immediate outcomes food and HRAC</th>
<th>Immediate outcomes SPFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The appointment of a project manager</td>
<td>-</td>
<td>• Work in the LOMA CoP and the AR system was facilitated and initiated</td>
</tr>
<tr>
<td>• A plan for the project was made</td>
<td>-</td>
<td>• Increased motivation for change among participants</td>
</tr>
<tr>
<td>• The municipal decision on finance of physical change (for the new production kitchen and dining room)</td>
<td>-</td>
<td>• Social learning processes initiated</td>
</tr>
<tr>
<td>• The construction of a partnership</td>
<td>-</td>
<td>• Head masters visions were met</td>
</tr>
<tr>
<td>• The inclusion of representatives of Culinary South-Funen and Department for Health and Prevention in the LOMA CoP.</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>
4.2. The exploratory LOMA school foodscape (2012).

“Food and healthy nutrition, and giving children and young people healthy eating habits and so on, it is something I am very engaged in, both as a teacher in home economics but also as private person. I would like to influence both my colleagues and the young people. Here, we really are in contact with a large group of young people, we could really change something about food, health and nutrition at a very big scale.”

Interview with Home Economics Teacher, LOMA coordinator.

The introductory remark of this section of the dissertation quotes the key teacher. She was interviewed about her own motivation for participation in the development and implementation of the LOMA foodscape. The quote illustrated how she ‘invested herself’ to a large degree in the development of the project in a way that was different from that of the project manager and the headmaster of the school. She seemed to think and work at a very concrete level and was very much aware of the importance of her own personal (strong) engagement and communicative competences.

She explicitly spoke about achieving change on a large health educational scale through the education of young people, which was a strong indication of an integrated ‘health and learning’ discourse. As an experienced home economics teacher she knew that students learn from hands-on activities that include food, nutrition and health. She combined her strong belief in the benefits of healthier eating with a wide, positive notion of public health that focused on participatory processes and the importance of setting and context.

Being an experienced teacher, with a special and professional sensitivity for the more vulnerable students, she took an active role in the development of students’ health-related action competences through participation in the LOMA-CoP and coordination of pilot-projects. Observations from the AR system at this stage indicated that overall, teacher’s engagement, belief and ability to give students confidence in their own ‘manageability’ seemed to be decisive for students’ acquisition of learning outcomes in LOMA. This also pointed to the salutogenic orientation of LOMA and to the importance of teachers’ ability to facilitate these processes in an educational setting.

During the 2nd exploratory or pre-implementation stage (2012), the AR system investigated how students’ participation in school food cooking, health and learning could be integrated in curriculum activities at school. These findings were used, both in the on-going cyclic reflections in the AR system (cf. fig. 2) and for publication in Paper I: “Local Public food strategies as a social innovation: early insights from the LOMA-Nymarkskolen case study”. Paper I informed about background, objectives, theoretical framework and preliminary results from the first pilot project for 6th grade (LP6). Focus was directed to students’ development of food and HRAC as learning outcomes and to LOMA as social innovation. Preliminary results at the student level indicated that 6th grade students’ participation in the one-week LOMA pilot project increased food knowledge and cooking skills and gave students’ a positive experience of having influence as a food and HRAC component (especially due to the possibility of influencing ‘their’ menu)
Moreover, results suggested that students experienced SOC (Antonovsky 1993) and commensality (pleasure from eating together; Johansson 2012), when they were cooking and eating with peers and teachers. Results also indicated that the establishment of educational links between the school and local farmers could be designated as a 'social innovation'. During the last months of 2011, the headmaster and the LOMA CoP decided to conduct a number of project-oriented weeks during 2012-2013 in order to test and train new ideas in pilot projects for all 7th grade (12-13 years) and 8th grade (13-14 years) students.

This unexplored new landscape of learning turned out to be a socio-cultural space, inhabited by various educational discourses such as 'hands-on-learning', 'health education', 'participatory learning', 'cross-curricular learning', 'home economics', 'cooking school food', 'farm-to-school learning' and 'science'. Key teachers cooperated with researchers in the AR system on the development of an appropriate frame for a basic scheme or template that was adjustable to the every-day life at the school, the conditions and resources at hand.

The two key teachers from the AR system functioned as the professional link to teacher teams for 7th (LP7) and 8th grades (LP8) after they had conducted the first pilot project for 6th grade. This facilitated valuable transfer of knowledge about 'what works' to the colleagues, who were going to lead the following pilot projects. An example of this was knowledge about how to use IVACE as a method to monitor health-educational activities that increased students’ development of food and HRAC.

This also allowed the coordinating LOMA teacher to disperse a 'catching enthusiasm' for the LOMA foodscape to her colleagues among whom some showed feelings of uncertainty and scepticism. All teacher teams were offered access to documents and results from the evaluation of the first pilot project – including video footage (e.g. Ruge and Nielsen 2012). Teacher teams were also offered advice from the coordinating teacher, but not all teams made use of this kind of scaffolding.

The transfer of knowledge was not a simple process of 'teachers telling something to other teachers who listened, copied/adjusted and implemented'. Issues of power relations emerged as some of the teacher teams, preferred to develop their 'own' LOMA pilot-project based on the guidelines (students should participate in cooking food for a common meal every day, all students should participate in excursions one time during the week as integrated in curriculum). A positive effect of this approach was that these teacher teams developed a strong feeling of ownership, however they tended to be more reluctant in sharing their experiences and evaluations with the AR-system.

The AR-system reflected on these findings and priority was given to the creation of owner-ship among more teachers (than the key-teachers in the LOMA-CoP) and the importance of having made ‘own experiences’ in the teacher teams. This turned out to be of value for the later implementation.

### 4.2.1 Examining participation

Based on insights from the first pilot-projects, a particular objective for me as a researcher was to obtain more in-depth information about students’ participation and the development of components of action competence. Data and observations indicated that some teachers did not find it easy to promote 'students initiative and common decisions' or 'students initiative and students decisions' according to the Danish national guidelines for Health Education and the associated IVACE model. Furthermore, as this
kind of participation was regarded as the prerequisite for achieved food and HRAC, I concluded that this space needed more attention from the AR system.

Consequently, there was a need to develop a supportive framework, so that teachers’ could monitor and evaluate students’ participation in LOMA activities. I collected data regarding this in the form of observations, video footage, photos and interviews with students and teachers. These data were shared and discussed in the AR sub-system, with the LOMA CoP and the whole staff at information meetings. Findings from pilot projects during 2012-2013 were published in Paper II: “Examining participation in relation to the development of students’ food and health related action competence in a whole school food context: Insights from the LOMA case study”. This study examined three cases of student participation in LP7 and LP8: A. ‘Students volunteer for work during break’, B. ‘Students develop the LOMA logo’, C. ‘Health and math project for 9th grade’ (see Paper II).

Examining forms of students’ participation in LOMA indicated that the educational activities facilitated students’ development of components of food and HRAC as learning outcomes. In addition, triangulation of results pointed to the importance of teachers’ choice of a collaborative educational design and the application of various forms of student participation. The IVACE matrix seemed to constitute a relevant tool for teachers to monitor forms of participation during the educational activities. With reference to the learning triangle (p.20) this issue concerned the ‘interactive learning processes’ where the cognitive and emotional dimensions were integrated in the learning processes.

In a foodscape perspective, these findings corresponded with the notion of children’s’ development of agency and ‘self’ in ‘smooth spaces’ with low structuration and less control, compared to ‘striated spaces’ with more structuration, more control, as described by Brembeck (2009) in the analysis of children in fronting foodscape. Findings indicated, that teachers – if further instruction was provided - had the possibility for organising the ‘learning-scape’ in ways that promoted students’ participation and development of food and HRAC.

Research on cases A, B and C gave evidence to suggest that the LOMA school foodscape could be designed as a place where school food cooking was integrated in a school health initiative in a participatory way, and that teachers at secondary level could regard this as an adequate and attractive educational space. Furthermore, findings suggested that the LOMA school foodscape could be implemented in a way that students regarded as meaningful, comprehensible and manageable (SOC) for their education.

In a wider perspective it was concluded, that teachers must receive adequate training in participatory methods (such as the use of IVACE) as an element in teaching Health Education. Based on experiences from the LOMA CoP it was recommended that a group of teachers and other key-persons should be established in other schools with similar intentions and challenges regarding school foodscape. This would be a way for teachers to share methods of situated, social learning on how to monitor, conduct and evaluate students’ development of components of food and HRAC. These findings regarding effects of student participation in LOMA were supported by results from a systematic review from on the effects of student participation in school health promotion (Griebler et al. 2014).

In addition to the signs of SOC among the majority of students, it is worth paying attention to indications that participation in LOMA seem to fit well to the group of
students with ‘special needs’. They participated in the pilot projects alongside with other students7. These data will be presented in a subsequent paper, where the focus is directed to the agenda of inclusion of students with special needs via food activities in a public school setting.

4.2.2. Changes in the physical space
During 2012 the physical and organizational spaces at school were highly vibrant and interwoven due to activities regarding re-building of the school. For some months, the LOMA CoP included architects, staff from the Department of Planning and special advisors on ventilation, sewerage and kitchen appliances. In June 2012, the craftsmen moved in and the home economics class room that previously hosted school food cooking during the pilot projects was demolished. So were other sections of the school and for some months the physical appearance was quite chaotic from an outsider look. Due to strong organisational power and joined efforts from management, teachers, other staff - and students - the school was still operating on full scale. Gradually, the pre-implementation stage was operationalized - school appearance changed as a result of joint efforts from Municipal Council, school management, project manager and LOMA CoP and the physical contours of the LOMA foodscape gradually became a reality for all.

4.2.3 Alternative food geography
Parallel to these efforts, the organisational space also comprised efforts on the municipal level of agri-food governance. Ideas for more sustainable public food procurement were on the agenda for several meetings and employees from Department of Public Procurement were included ad-hoc in the LOMA CoP. With reference to the framework presented in fig. 1. Both the ‘State-Civil Society’ axis and the ‘State-Market’ axis became interrelated, mutually reinforcing each other at this stage. The strong social capital regarding ‘sustainable food’ in the area turned out to have nodes in several other municipal arrangements, such as Svendborg being one out of two Cittaslow cities in Denmark8. The citizen perspective represented by the CoP participants provided an argument for a sustainable, local, public food strategy that did not have ‘lowest price’ as the main criteria. Rather, normativity and ambitious goals regarding learning and ethics was at play in the tendering process for food delivery to Nymarkskolen.

The result of these negotiations was an integrated public food procurement approach that included a demand on organic food and a special request for local cooperation in terms of educational activities. The CEO of Municipal ‘Team Procurement’ invited local farmers and suppliers to an information meeting at the school to discuss the intentions and plans. At this meeting the mutual interests in the LOMA project were confirmed among the participants. As a next step, the extended LOMA CoP continued with the planning process. As a researcher I participated in an AR sub-system that investigated and estimated the expected food purchase at NS on a one-year basis. Based on this, a bidding process was initiated and announced in regional, public media in spring 2013. From this point, activities were transferred to the ‘state-market’ axis and conducted in accordance with

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7 In regular weeks they have their own classes.
8 [http://www.cittaslow.svendborg.dk](http://www.cittaslow.svendborg.dk)
EU and national procurement legislation. The tendering process ended by July 2013, and in August the Municipality of Svendborg had made contracts with 9 local and regional food suppliers.

In summary, the result of these contracts turned out to be the delivery of food from producers situated at primarily Funen and the Islands, as well as other parts of Denmark. Mostly organic food producers, but also smaller and larger wholesalers from the area, were included. Food was also sourced from other countries. In 2013, after the inauguration of the LOMA kitchen in October, the newly employed kitchen manager was offered a list of possible contractors within the various categories of food. Her selection and purchase was guided by the nr. 5 LOMA principles: *The kitchen should as far as possible include locally produced food (preferably organic)*. The last section of the 3rd implementation stage in this dissertation includes more information about the tangible outputs - in the form of local and organic food purchase - as a contribution to sustainable development.

The outputs and intermediate outcomes from the exploratory stage of LOMA are presented in table V. below.

### Table V. Summary of output and outcome for HRAC and SPFS in 2.exploratory stage.

<table>
<thead>
<tr>
<th>Output</th>
<th>Immediate outcomes: components of food and HRAC</th>
<th>Immediate outcomes: SPFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Pilot projects were conducted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Students participated in planning their LOMA week.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 400 students out of 620 participated. App. 60 teachers participated.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Development of educational materials that integrated LOMA in curriculum.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Excursions to local farmers, mills and fishermen were conducted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Evaluations were conducted.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Preparations for municipal tender for LOMA.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Increased development of components of food- and HRAC through participation (knowledge and insight, motivation, practical skills and cooperation).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Increased inclusion of students with ‘special needs’ (problems such as illiteracy, Danish as second language, ADHD).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• An increased shared understanding of the need for a sustainable, municipal public food procurement strategy that contributed to the re-localisation of food chains in the local community.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• An increased share understanding of the ‘untapped learning potential’ of this.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• An increased shared motivation among teachers and students for contributing to sustainable development as a synergistic effect of the organic share and the reduced transportation of food in the LOMA menu.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• An increased dialogue and cooperation between the school, teachers, local farmers and suppliers that potentially could lead to the integration of education and farming, social innovation and reduced 'silo thinking'.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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9 Local was defined within the scale of: Municipality, Fünen and Islands, Southern Denmark and (in some cases): Denmark. Focus was directed to the place of the primary production site.
4.3. The Implemented LOMA school foodscape (2013)

“I think that the pilot weeks have contributed to the fact that the kitchen [activities] are really running well now. But of course it has also meant something for the anchorage in the teacher staff, that we had some enthusiasts. But due to the pilot weeks, a large part of the teachers became familiar with [LOMA] before it became ‘serious’. These days I am very happy to hear teachers – when they are asked by people from outside school - talking with pride about [LOMA], having an awareness, that this is something special and that it is a privilege to have it like this ..”

Interview with headmaster, October 2013

In the introductory remark to this section, the headmaster emphasised how useful the LOMA pilot was for a successful implementation of the total school foodscape from her point of view. Moreover, she appreciated how teachers had now taken ownership to LOMA.

The inauguration took place on the 21st of October 2013, where the new LOMA facilities were taken into use in the presence of the Minister of Education, Mrs. Antorini. All the students, teachers, farmers and partners were invited; the newly employed kitchen manager was cooking with a team of students; thoughts and visions became real artefacts; local food inhabited the kitchen and the plates. All spaces unfolded in a state of flux, experiences from pilot projects were put to work - that day represented a milestone for the integration of both the physical, organisational and socio-cultural spaces in the implemented foodscape: Cultural expressions such as the ministers’ and mayors’ speech, common songs and general appreciation surrounded the festive afternoon meal and all guests went to see the new facilities: the production kitchen and the dinner hall. Students and staff had prepared ‘local food tastings’ and wore the new aprons with LOMA logo that students had designed (cf. Paper II).

Other students inhabited the new educational spaces next to the dinner hall and gave examples of LOMA education. For instance the coming 9th grade project ‘Math and Health – Living a good and healthy life on a student budget’ was presented here. This project was later conducted in November and served as an object for the subsequent intervention study regarding students’ development of food and HRAC as learning outcomes (more about this in the next section).

Later, in February 2014, when the LOMA foodscape had been operating at NS for five months, the headmaster stated: “This has become so much more than a meal system – which was also the ambition”. Comparing this to the first interview from fall 2011 (p.33) there was relation between the two statements, that indicated that she is satisfied with the achieved goals. A supplementary explanation was also the fact that the LOMA foodscape provided new settings for students’ learning that corresponded very well with the demands in the 2014 school reform. The reform required new forms of education, increased integration between practice and theory and improved relation between school and ‘environment’ (Danish Ministry of Education 2015).
4.3.1 Changes in the organisational and socio-cultural space

The transformation from project to permanent operation was not a simple process and required willingness for dialogue and compromise among the participants. The project group and the LOMA-CoP ended and LOMA turned into a focus area under the head master's management. The AR-system was transformed into a relation between a few teachers and me as a researcher. We shared the interest in students' development of food and HRAC as learning outcomes. A local LOMA-group at NS, led by the coordinating teacher, was formed. Members of this group were teachers, who supported students’ participation in cooking activities every day (in shifts), the science teacher (who had also participated in the LOMA-CoP) and the kitchen manager.

This stage was characterised by major changes in the organisational and socio-cultural space of the LOMA school foodscape. As a result of negotiations between management, teachers and students it was decided, to change the daily schedule. The aim of this was to provide time for a common meal for all students and teachers at the same time. Most important was the integration of LOMA in the educational activities in the everyday life of the school. Originally it was planned for the students to eat in teams, between 11 and 13. This plan, however, triggered great frustration among students because they could not meet across the classes in the big break - for example for ball games (cf. Benn and Carlsson 2014). Teachers supported students and to accommodate this, it was decided to devote 20 minutes to the common meal every day from 11:20 AM till 12:00 AM. During this time, it became mandatory for students to sit down at the table with peers from the class. Then it was free for the students to continue the meal break or go for other activities. It was also decided that the teacher, who had the class immediately before the meal break should participate in the meal along with students.

This change of context for students' lunch break was a result of insights from the pilot projects. Data from the AR system had shown that students were very happy about eating together - and very happy if teachers joined the table. The last finding seemed to come as a surprise to adults who often seemed to assume that young people preferred to be together with young people during break. However, data suggested that the teacher’s presence was an important element in the establishment of a 'common meal'. In the perspective of the learning triangle (Illeris 2003), the ideas of students’ formation of identity - or rather ‘self-orientation’ - are relevant to include concerning these issues. Illeris defined the notion of ‘self-orientation’ like this:

“ I will use the term self-orientation which is suitable for capturing the fact that this is a very wide-ranging process where one orients oneself with a view to finding oneself, one’s options, ways of functioning and preferences, gradually building up a certain core identity and some rationales for all the voices with which one is constantly presented” (Illeris p.371)

In relation to this Illeris also emphasised the importance for students to have a good relation to the teachers (p. 372). This corresponded very well with the fact that NS was a secondary school and that students were eager to explore the difference, compared to the ‘childish’ primary school - and to relate to the teachers in a ‘young’ or ‘semi-adult’ way. Moreover, as students came from several other schools in the area, self-orientation had to be integrated in all learning processes and in the basic identity of being a student at NS.
In this light, the new dining hall was an excellent space for students to orient themselves in a structured and safe space (Illeris 2003; Ziehe 2009). Most students seemed to approve of the new conditions. However, data from focus-group interviews indicated that some students found these social arrangements too demanding and they missed the simple ‘classroom lunch’ from before LOMA was implemented (see more information about this in Paper III). Also, some students found that there was too much noise in the dining hall. Because the AR-system and the reflection cycle were still functioning in the implemented stage of LOMA it was possible to transfer these findings to the school management and the local LOMA-group. This facilitated immediate adjustments and an increased attention towards the more sensitive and - maybe vulnerable - students.

The integration of LOMA in the educational activities constituted a challenge for the teachers and the whole school. The new schedule from October 2013 prescribed, that each class had one LOMA week and that the class was divided in two halves that ‘switched’ during LOMA-weeks: one half was learning how to cook (subject of health) and the other half was learning the regular subjects (subjects of e.g. science, mathematics Danish and media). The idea was that these lessons should be related to the LOMA approach in a curricular or cross-curricular way. Teacher teams approached the challenge within their respective subjects and I got the opportunity to study the influence of LOMA on a particular group of students. That study (LOMA-13) investigated a cross-curricular LOMA intervention at 9th grade (14-15 years). The teacher in charge of this activity also participated in the AR-system during pilot-projects and we continued the reflection cycle based on our previous shared area of interest (A), framework of ideas (F) and methodology (M).

4.3.2 The LOMA-13 study
The field activities consisted of a two-week LOMA curriculum activity for 9th grade students (14-15 years old). The teacher team planned and organised with curricular reference to Danish National guidelines for mathematics and Health Education (Danish Ministry of Education 2009) and to the LOMA guidelines. The pedagogical and didactic approach included elements both from project learning and story-line methods (Creswell 1997). The theme was entitled: ‘Living a good and healthy life on a limited student budget’ and the youth groups imagined that they were all five years older, joining youth education and living together. During these weeks students participated in planning meals, cooking and serving food for the whole school together with professionals as integrated in curriculum. The educational activities within this participatory design, were:

- Planning the meals
- Lessons on hygiene and nutrition
- Cooking food
- Serving food
- Sharing of meals (teachers and students)
- A themed project: ‘Planning to Live a good and healthy life on a student budget’. This also included:
  - Application of mathematical methods
  - Visits to an organic farm.
  - Group assignments.
Research was conducted primarily by qualitative methods. My sources of data were:

- Observations from class rooms and excursions
- Semi-structured focus group interviews
- Video-footage and photo (ethnographic methods, cf. Pink 2013)
- Student reports (group assignments).

Data was analysed by an interdisciplinary framework that included theories from HPS, transformative learning and foodscape studies. Nvivo 10 software was used as a supplementary tool for organising and analysing data.

In addition to this I conducted a quasi-experimental intervention study (QEIS) based on quantitative methods with a pre-post test design, in order to collect complementary data. The aim of QEIS was to measure the impact of the educational intervention on students’ development of food and HRAC by quantitative methods. QEIS focused on a sample of 54 students from the classes of 9th grade students from NS and a control group with 9th grade students from another school in the municipality. Students at the intervention school (NS) and control school (CS) answered a questionnaire (see Appendix A. paper III) before LOMA-13 was initiated (baseline) and after it was finalised (follow up) at IS. Questions regarded components of food knowledge and insight in food production, health, wellbeing at school, sustainability, current healthy lifestyle and expectations of a future healthy lifestyle.

Questions were phrased with reference to the guidelines for health education at 9th grade (Danish Ministry of Education 2009) and the HPS framework (Jensen and Simovska 2005; Jensen and Clift 2006). I used the same guidelines for the qualitative, semi-structured focus group interviews of IS students. This was conducted on the last day of the two weeks. Evaluation of LOMA-13 was conducted according to realist evaluation principles (Pawson and Tilley 1998; Yin 2009; Tones and Green 2004) in order to investigate both the mechanisms and the outcomes.

**Results - qualitative data**

With reference to Ziehe’s theories (cf. 2.2.) about young peoples’ learning there were indications that the LOMA-13 learning space was a well designed ‘setting’, that served as a safe and structured space both for students self-orientation (imagining) and acquisition of learning goals. Through class-room observations I found that students seemed to thrive when they were working in the youth groups were they were supposed to ‘look at themselves’ as 5 years older than now (14-15 years old). Within this universe they seemed gradually to acquire components of mathematical, food and health competences.

A result that emerged from these observations were that students’ mental patterns regarding food and health seemed to reflect a dichotomy: what was healthy vs. what was not. But their actions did not (always) reflect this knowledge in current life. However, the design of the educational activities allowed students to make mental ‘excursions’ in order to reflect on and test their ideas about current ‘healthy-or-not’ life style. In some cases students’ thinking took on a very conventional and traditional form, for instance regarding their planning of a Christmas gathering in their ‘imagined’ universe. The background for this example is described in the following report from a classroom observation:
Classroom observations in LOMA-13

During the two weeks, I observed students while they worked in groups during the first days of the assignment for ‘Living a good and healthy life on a study budget’. The following is an example of a report, that I made shortly after the observation and translated for dissemination:

“The teacher presented me for the students and I told them about my research. I asked for permission to use video footage and students gave their consent. By using a smartphone as a recorder – instead of the larger Canon camera - I found it easier to walk around and talk with students. Each group seemed to have their own place in the room and my visit made a demand on students to talk to me as the ‘inhabitants’ of that place. Some students seemed to feel more comfortable in this ‘role’ than others. The room was dominated by the presence of modern electronic devices for search of information such as PC’s and smartphones. Electric wires were hanging down from the ceiling, providing each student with power from sockets. Students used headsets and no noise apart from tapping was detectable from the electrical devices. The classroom seemed to be organised according to students’ own decisions regarding the place for their respective groups. Table were pushed together and students were sitting in a slightly unstructured manner around the tables. Some were tipping their chair, one girl were setting the hair of another girl, who was using the PC for searching and writing. In general, students seemed to work in a concentrated and motivated way on these ‘search processes’. They solved tasks in an imagined life as young people living together and joining youth education. I sought to approach them in a polite manner and asked, what they were working on. The following is an example of how students in one of the groups answered:

Girl1: We are making a budget for a Christmas gathering, together with our family.
Girl2: We’ll be twenty people and we are serving welcome drinks, starter, maincourse and dessert.

While students told me this, they looked at the computer screen and read aloud from their ‘shopping list’ for the event. Even though the task concerned an imaginary event, students seemed to enter this narrative in a both playful and determined way. They told me that the main course consisted of “roasted duck, sugary creamed potatoes, white potatoes, french potatoes [chips] and brown gravy”. For dessert they would serve “rice-pudding with cookies”. I responded, that it sounded as a nice meal and asked them whether they considered this as a healthy menu? Students answered:

Girl1: Well, no I don’t think so (smiling).
Girl2: (interrupting S1) It is never [healthy] during Christmas. You must always eat a lot of fat during Christmas. That’s the way it is (making decisive gestures with her hand).
(Girl1 nodding, approves)
Interviewer: Is that because it is cold and wintertime?
Girl1: Yes, it is Christmas time and it is okay to put on ‘a little flesh’ during Christmas.
(Girls and interviewer laugh together a bit)
Interviewer: (approaches the third member, a boy):
How about you, do you agree on that?
Boy1: (looks down at his smartphone, nodding, embarrassed) hm..yes...

Interviewer: Well, you young people are still growing, you do need some food, I guess?...
(Girls laughing again, looking at each other with an ironical 'glimpse')
Girl1: Sure, but after Christmas we have to get on the fitness treadmill (laughing)
Interviewer: okay, you'll be fine – thanks for talking with me.

The way that students responded to my questions was an example of the ambiguity that characterised their notions of food and health: On the one hand they chose a fat and sugary menu, on the other hand they knew how unhealthy this was. I interpreted this as an example of how contradictions and dilemmas influenced students’ development of personal foodscapes during this educational activity. Moreover, it seemed as if students had an almost ‘adult’ way of ‘living with’ this (cf. Andersen 2007). As if they felt a pleasure from oscillating between the various - and often contradictory - positions (dichotomies). They seemed to have ‘fun’ and feel ‘liberated’, when they decided ‘their’ menu.

Confronted with my questions, they seemed to tackle the obvious discrepancies by using sarcasm and irony “ after Christmas we have to get on the fitness treadmill” and then abolish the tensions by laughing. As it occurs from the quote I had to laugh too, because I was surprised of what they said and had to suppress my own inclination to ‘teach them’ what I thought was right and wrong. So, laughing together constituted a bridge for release of tensions, shared knowledge and meaningfulness, but also ambiguity, between me and the girls “ (see more in Paper III).

I have included more data from LOMA-13 observations from excursions to an organic farm, in Paper III. Compared to Ziehe’s personal experience of de-structured spaces in relation to a school excursion (Ziehe 2009, p. 194) I here experienced an adequately structured learning space, where students shifted between listening, asking questions, investigating and writing down the answers. In the rainy and muddy field students studied cropping systems, cater-pillars in red cabbage, footprints from a deer and made vegetable price-calculation with equal enthusiasm. They were very friendly towards their teacher and each other. Often holding hands, smiling and giving each other a ‘hug’. However, 2-3 students, who wore insufficient clothing complained about being cold and asked for permission to stay inside, which was not allowed. More data from students’ group work and the focus-group interviews that I conducted on the last day of LOMA-13 were analysed and disseminated in Paper III.

Results from qualitative data from LOMA-13 indicated that students developed knowledge and insight (about food and farming), practical skills (planning, cooking, serving, dishwashing and cleaning) cooperation (during all stages of LOMA-13), ownership (the approved of the new daily scheme with LOMA), critical thinking (about health and healthy food) and motivation to participate in LOMA (see Paper III).
Results from quasi-experimental intervention study (QEIS)

Results from QEIS indicated that LOMA-13 as a two-week intervention had a positive and statistically significant impact on students’ knowledge about vegetables. The mean score for knowledge about vegetables increased from baseline to follow-up by 0.43 at NS (0.23 at CS, see Paper III). Students’ insight in the origin of food in relation to climate plant zones and sustainable food sourcing strategies was investigated from a cross-curricular perspective. This included learning goals from subjects of science, home economics and health education. Results showed a positive but non-significant development of 0.21 at NS (0.34 at CS) from baseline to follow-up.

Most of the results from QUIS were non-significant and did not give evidence for any effect of LOMA-13. Some answers seemed inconsistent both at NS at CS. However, the results gave some additional insight in NS and CS students’ food and HRAC, their beliefs and self-esteem regarding their own health (see Paper III). There were indications, that students’ expectations to own healthy lifestyles were low at both schools. Both at baseline and follow-up in terms of own ‘current’ and ‘in-one-year-healthy-lifestyle’.

Results indicated, that students did have knowledge about the elements that constitute a healthy lifestyle, but they found it difficult to act according to their knowledge. This ambiguity seemed to be related to the contradictory, processes of self-orientation, which are typical for young people at this age, according to Illeris (2003) and Ziehe (2009).

I triangulated qualitative and quantitative results in order to find convergent evidence and this was primarily found regarding students development of knowledge about vegetables. Vegetable knowledge was regarded as a central component of food and HRAC and related to a healthy lifestyle. Findings from the LOMA-13 study were disseminated in Paper III: What did they learn? Results from the LOMA case study. In the conclusion it was suggested, that students developed food and HRAC as learning outcomes, when they participated in LOMA-13. Furthermore, they experienced this learning as useful and meaningful, which indicated that sense of coherence was a result too.

In addition to this, there were indications that students were motivated for a healthier lifestyle, but also that they needed more support from context-based health promoting initiatives and learning ‘settings’ (Ziehe 2009) to generate and use these newly acquired action competences. In this perspective it is interesting, that LOMA was not only a short-term intervention, but an installation with at least a 10 year perspective. Students’ learning processes in LOMA-13 seemed highly influenced by the on-going processes of self-orientation. It should also be acknowledged, that a minor group of (more sensitive?) students seemed to find the social arrangements too demanding and this made them feel uneasy during lunchtime.

Limitations

A limitation of QEIS was the small sample size, which reduced the power of analysis and external reliability. Furthermore, the inconsistence in students’ answers indicated that the study was contaminated by factors that were not ‘controlled’ in the intervention study, e.g. influence from media, parents and peers during the two weeks. Also the questionnaire itself may have influenced learning activities between pre- and post test – for instance at the control school and in the homes of the students. Furthermore, the design may have been too limited at some points, as it did not leave enough room for improvement between baseline and follow-up. Another issue regarded whether a QEIS was an adequate research method for the test of students’ development of food and HRAC.
in LOMA-13. Results suggested that primarily (summative) knowledge and skills could be tested in this way. Probably, with higher efficiency if the design was improved.

**Implications for practice**

Teachers and pedagogues in the LOMA foodscap should pay special attention to the wellbeing of the more ‘sensitive’ students. With reference to Ziehe (2009) it may be useful to investigate whether these students are struggling with ‘internal conflicts’ regarding their self-orientation processes. So, when a student is reluctant about participating in a common healthy meal, this may not be caused by the food-activity in itself, but rather by issues regarding ‘self’ in relation to parents and peers. These struggles might also reduce these students’ learning outcomes.

Based on the findings it was recommended, that future LOMA educational activities should be organized in a ‘setting’ that supported students’ development of motivation for learning, healthier eating habits and acquisition of action competence regarding food and health. In a wider perspective, this aim should to a higher degree, than what is common today be made with respect to students’ self-orientation processes in general.

This approach might also be integrated in youth education programmes as en element in the facilitation of students’ acquisition of various competences. This could contribute to reduction of inequality in health among youth - as well as reduction of inequality in education. A longitudinal study was recommended to investigate long-term outcomes. A relevant question for research was: “Did a whole year impact from a LOMA school foodscape affect students’ health expectations differently, compared to just a couple of weeks in the LOMA-13 study?”. More efficient methods for detecting improved ‘quality of life’ and SOC among youth might be applied.\(^\text{10}\)

**Table VI** provided a summary of the outputs and the immediate outcomes from the implemented stage and from LOMA-13 for the participating students. In the third column the immediate outcomes regarding SPFS were presented.

\(^{10}\) An analytical framework for ‘QOL’ within healthcare has for instance been suggested by University of Toronto [http://sites.utoronto.ca/qol/](http://sites.utoronto.ca/qol/)
Table VI. Summary of output and outcome for food and HRAC as learning outcomes and SPFS in the implemented LOMA foodscape (stage 3).

<table>
<thead>
<tr>
<th>Output</th>
<th>Immediate outcomes: food and HRAC</th>
<th>Immediate outcomes: SPFS</th>
</tr>
</thead>
</table>
| • Students participated in planning their LOMA-13 weeks.  
• Students received education in nutrition and hygiene.  
• New production kitchen installed.  
• New dining hall.  
• Employment of kitchen manager.  
• Appointed teacher LOMA coordinator.  
• Management decisions on the shared common meal.  
• Management decision that teachers should participate in the joint meal.  
• Contracts with 9 local suppliers  
• App. 40% local food  
• App. 50% organic food  
• LOMA is running for at least the next 10 years. | • Students who participated in LOMA-13 developed components of food and HRAC as learning outcomes in the subjects of Health Education, Math and other subjects.  
• Students practiced self-orientation integrated in learning processes and acquisition of learning goals.  
Other outcomes (all students in every-day life at NS):  
• Students exhibited healthier eating behaviours due to changes in the school food environment (more students had lunch)  
• Less unhealthy food during break at lunchtime.  
• Students experienced increased ‘quality of life’ and ‘sense of coherence.’  
• A minor group of students experienced the joint meal with uneasy feelings. | • Cooperation between school, teachers, local farmers and suppliers in the form of ‘educational links’.  
• Re-localisation of food systems.  
• Increased sustainability in public food sourcing practice.  
• LOMA changed from project mode to ‘operational mode’ as integrated in the daily life of the school.  
• An increased shared understanding in the LOMA CoP of the implications of the agreement that had been made with the local suppliers.  
• An increased understanding among teachers and students on how LOMA menu contributes to sustainable development.  
• An increased understanding among students regarding about the local food system.  
• Increased motivation among students for development of food and HRAC in future life.  
|  

5.0 Discussion

Based on the summary from the ‘LOMA foodscape journey’ I will discuss the outputs, immediate outcomes and possible long-term outcomes from the implementation of the integrated LOMA foodscape at NS. This will be done in relation to the main areas of interest for this research: Students’ development of food and HRAC as learning outcomes, students’ healthier eating habits and local development of SPFS. Implications for research and practice and limitations of the study will be taken into consideration and included in the final conclusion.

5.1 Food and HRAC

Results from both the exploratory and the implemented stage of the LOMA foodscape suggest convergent evidence for students’ development of components of food and HRAC when they participated in LOMA activities. These findings regarded positive outcomes on the personal level and were in line with the conclusions in a recent review of the effect of students’ participation in health promotion initiatives (Griebler et al. 2014).
A recent Cochrane review (Langford et al. 2014) of ‘randomized controlled’ HPS based interventions found low to moderate evidence for HPS contributions to health among students. This corresponded with results from QEIS, that found statistical evidence only for students’ development of ‘vegetable knowledge’ (cf. Paper III). In comparison, the qualitative based methods in the LOMA study provided in-depth information about students’ development of food and HRAC in a way that seemed better suited for capturing the complexity and ambiguity that characterized students’ learning about health at secondary level.

Findings from LOMA-13 indicated that students’ self-orientation and learning constituted a basic learning structure (cf. Ziehe 2009), when they participated in the interactive LOMA activities (cf. fig 1. The learning triangle and 2.2.). Furthermore, that acquisition of learning outcomes such as food and HRAC were integrated in this learning structure. The simultaneous integration of the cognitive, emotional and socio-societal dimensions in students’ learning was evident in LOMA-13. This may have been fuelled by the theme ‘Living a healthy and good life on a student budget’, that strongly encouraged students to integrate self-orientation with acquisition of learning goals in mathematics and health. In this sense, the learning environment became both a cognitively and emotionally attractive ‘setting’ for students’ acquisition of learning goals.

However, this also meant that the ‘search-processes’ (Illeris 2003; Ziehe 2009) simultaneously encompassed issues of identity and issues of food and health. Results indicate, that this dynamic was best captured by qualitative methods in this study. This finding corresponded with the methodological conclusions in the Cochrane review, where it was emphasised qualitative methods should be included in HPS research to provide complementary insights (Langford et al. 2014, p.32-35).

Furthermore, the Cochrane review concluded that more HPS initiatives ought to integrate education and health due to the inextricable links between health and education:

“Despite the obvious connections across the globe, structural barriers prevent the realisation of this mutual agenda. Government departments responsible for health and education often operate in isolation from one another and this fundamental connection is lost /.../ there appears to have been little advance in breaking down this silo approach/.../ Cross-departmental working between health and education is required to allow HPS policy to achieve its potential”(p. 34)

Current research on the LOMA school foodscape represents an example of ‘cross-departmental’ working and an attempt to apply a mixed and realist evaluation approach on an HPS activity. Furthermore, it was an example of how education and health was integrated in a participatory HPS activity and measured by qualitative and quantitative methods. In this perspective the study indicated, that there was a potential for combining the concept of action competence with the IVACE method in order to monitor students’ participation in health related educational activities.

In a wider learning perspective the study suggested that students’ learning and self-orientation were always intertwined, which was assumed to have large implications in an educational setting.

Moreover, it was concluded that teachers’ capacity building with regard to these implications should be addressed in relevant teacher education activities. Findings
suggested that it was possible for teachers to frame activities in ways that facilitated a safe and structured development of selected components of action competence as learning outcomes. A valuable and meaningful component in this approach would be to empower students by involving them in dialogue about the educational activities and give them influence (cf. IVACE) at both the monitoring and evaluation stages.

5.1.1. Healthier eating practices
The issue of improved eating habits among youth was another area of interest for the case study of the LOMA foodscape. Findings indicated that students’ participation in the LOMA foodscape led to healthier eating habits for a large group of students, because 10-40% of students began to eat lunch on a daily basis. For some students the change from ‘no lunch’ to ‘eating lunch’ was a simple operation, but for a smaller group it seemed to be a large step. By January 2015, app. 50% of students had made a prescription for the LOMA menu, the rest of students brought food from home or – still - they did not eat lunch (app. 5 % of all students). It is recommended, that further research in LOMA applies a pre- and post test design in order to find stronger evidence for this kind of changes at the level of school, than this study could offer.

The present study indicated, that the introduction of a more structured space for students’ eating, disclosed, that ‘hunger’ was actually more predominant at the school, than what was assumed initially. The replicability of this finding ought to be tested in larger research design, that aimed to investigate to which extend ‘hunger’ may contribute to the ineffective learning processes that currently are discussed, based on Danish students’ poor results in e.g. PISA tests. As there is currently no national school food program in Denmark, such a study might be of interest for a broader audience of students, teachers, parents, public decision makers and other stakeholders (e.g. foundations regarding food, health and learning in schools).

NS students obvious desire for more structure and a safe space for self-orientation (cf. Ziehe 2009 and 2.2.) constituted, in a learning perspective, part of the explanation for their acceptance of the mandatory ‘lunch-break’. Even though this was a reduction in their ‘liberty’, most students did not seem to mind, probably because they got something else in exchange: An expanded, safe learning and self-orientation space, attractive company and an experience of commensality and ‘adult’ behaviour. Furthermore, some students also reported about ‘less hunger’ and subsequent improved motivation for learning in the hours after lunch. This corresponded with teachers’ report of improved concentration after the implementation of the LOMA foodscape in focus group interviews (see Paper III).

Teachers’ attendance at the common meal was highly approved – however, it should be noticed that not all teachers found this new (mandatory) activity attractive, because it touched on the issue of teachers’ working schedules and private, family eating habits. A constructive dialogue between teachers and school management about the level of teachers’ involvement in the common meal was initiated and has continued during school year 2014-2015. As teachers were the ‘key’ for successful implementation of a LOMA foodscape further research may focus especially on teacher’s perceptions of LOMA and their capacity for – and feelings about - participating as teachers.

Regarding the nutritional contend in the LOMA menu compared to the packed lunch from home, findings indicate, that the LOMA menu due to the basic schedule of ‘one day with
fish and one day with vegetarian food during the week' represented a higher nutritional quality than the average packed lunch from home (Sabinsky et al. 2011; Benn and Carlsson 2014). The implication of this for further research would be to select an adequate design to capture this difference in nutritional quality and eventually measure changes by biomarkers. An attempt of testing such a difference was presented in a recent study regarding the nutritional impact of New Nordic Diet on schoolchildren. Here there were positive results, due to a.o. increased intake of fish and vegetables (Andersen et al. 2014). In relation to this topic, another recent study of the influence of New Nordic Diet on children's cognition and performance in school (compared to packed lunch from home) showed no effect on children's concentration performance, processing speed or math performance (Sørensen 2014). However reading performance was improved. Both studies might inspire future evaluation designs for LOMA interventions.

In the present study focus was on food and HRAC as learning outcomes and it was reasonable to suggest that the impact on students food and HRAC was strongest during the 'LOMA weeks', where each class was cooking the food that they themselves had planned two months before. In those weeks classes were in a state of flux, when students participated in cross-curricular food-related education activities that also facilitated self-orientation processes. However, these interactions in the LOMA-learning-scape needed to be better investigated.

By the beginning of school year 2014-2015 it was decided, that each class at NS had two weeks for LOMA educational activity compared to just one week as the year before. The aim of this change was to expand both the physical, organisational and socio-cultural space for students’ development of food and HRAC as learning outcomes. In a learning perspective it was assumed, that this change strengthened the learning environment in the production kitchen and promoted students’ sense of coherence and improved learning because they experienced a 'whole week' instead of only half a week. Moreover, they also obtained higher levels of mastering new kitchen skills, which was a relief to the hard working kitchen manager and her staff. An example of how students and professionals cooperated was visualised in the edited video from the LOMA kitchen (available online, Ruge 2015a).

5.1.2 Students’ identity and self-orientation - a foodscape perspective.

Foodscape studies constituted a central pillar in the conceptual thinking and served as a method for capturing complexity in multilevel interventions (Brembeck 2009), because it provided an improved understanding of the way that students inhabited the physical, organizational and socio-cultural spaces in the LOMA foodscape. In the socio-cultural spaces students ‘learned something useful’ and developed new food and HRAC - through participation in interactive food activities (cf. Dolphijn 2004; Brembeck 2013; Paper III). Moreover, the foodscape approach was particularly useful for the analysis of qualitative data from focus group interviews and provided insight into NS students’ understanding of how they participated and developed components of food and HRAC.

Furthermore, this type of in-depth information provided further knowledge about how the various spaces were represented in the communicative event through students’ talk about their own emotions about food, their attitudes and experiences of the food, the meals, the curriculum and the health-messages they encountered (cf. Paper III). This form of internalization of the LOMA foodscape in language entailed a 'personalized

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11 Not to be confused with the non-edited video footage that constitutes my data.
foodscape’ (cf. Johansson 2012) that seemed to be a part of students’ basic learning and identity work.

In this study the theories of learning and identity by Illeris and Ziehe constituted the conceptual framework for understanding students' indent formation or rather the more reflexive notion of young peoples self-orientation regarding food and health. Another recent student on 'Health Identity and Health Education in Schools' (cf. Grabowski 2013) investigated pupils’ ‘health identity’, a notion that also comprised pupils’ requirement of ‘action competence’ as a tool for formation of a health identity. The notion of health identity might be helpful for a special focus on health education. Especially the plural form: ‘health identities’ (p. 34) may correspondence with the findings in current study of how the reflexive and inter-changeable character of students’ identity work and self-orientation influenced their development of food and HRAC (cf. Illeris 2003; Ziehe 2009). Grabowski concluded from his study, that

“ It is evident that health mattered when it could be related to the adolescents’ everyday life and their existing observations of their identities”.

Health identity among adolescents was defined as:

“Adolescents' observations and expectations of their own health and the way their health relates and compares to the health of others and to their knowledge about health”(p.34).

This definition may be useful specifically in health education, however it may be a too narrow concept for fully understanding young peoples’ basic individual, on-going struggle to form a ‘core identity’ and to conduct self-orientation which current study has indicated (cf. Illeris 2003 and Ziehe 2009).

In another study of young peoples health, Wistoft (2010, p. 21) stated that

“ by defining themselves through health and health-related topics the young people construct a conscious health identity”

She assumes that young people use this for navigation in the complex net of communication and health-related topics. Even if this approach encompassed a more reflexive view on identity work than Grabowski it still seemed to encapsulate the health identity and ignore the rest of a young persons’ identity. If this is the case, there may be a risk that health education efforts miss important key-understandings about the reflexive nature of young people’s learning and identity in late-modern society. The current study indicated that a WS approach to the improvement of school food rather should recognize this, in order to provide an efficient method for improving both learning and health of young people.

The present study indicated that the integration of a practice-oriented, participatory (IVACE), settings based health education approach to students learning and ‘becoming self’ - as in the LOMA approach - could provide a more sustainable platform for the ‘education of healthy subjects’ (cf. Langford et al. 2014). This assumption was supported by Benn and Carlsson:
An optimal organisation of learning through school meals would include: Opportunities for pupils to develop practical action competence dimensions, opportunities to explore and develop social competence dimensions, as well as learning opportunities encouraging active participation in the everyday life of the school in relation to school meals. In other words, it needs not only to encompass to know, but also to do, to be willing and to become” (Benn and Carlsson 2014, p.30)

5.1.3 LOMA case study as a feasibility study?
Considering LOMA at NS as an ecological public health intervention, the program should potentially be applicable to other schools in Denmark. In that perspective, the LOMA study could also be regarded as a feasibility study, where the term feasibility was “used more broadly than usual to encompass any sort of study that can help investigators prepare for full-scale research leading to intervention” (Bowen 2009).

In the light of this assumption, the case study of LOMA enabled an assessment of feasibility that focused on whether findings were relevant and maybe sustainable for a larger LOMA intervention. As a consequence of this argument it was also reasonable to apply the RE-AIM framework (Glasgow et al. 1999) in order to evaluate the efficiency of LOMA as a multilevel, public health intervention.

The RE-AIM abbreviation stands for: Reach, Effectiveness, Adoption, Implementation, and Maintenance of an intervention. Adapted to the implementation of LOMA at NS, the RE-AIM framework (Glasgow and Linnan 2008) provided a useful overview - see table VII. In this thinking, the LOMA intervention would obtain a positive ‘score’ regarding effectiveness, adoption and implementation. Maintenance in more than a 10-year perspective would require an evidence-based investigation of long-term outcomes.

Table VII Applying the ‘RE-AIM’ framework for evaluation of LOMA as a public health intervention.

<table>
<thead>
<tr>
<th>Reach:</th>
<th>620 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effectiveness:</td>
<td>LOMA was suggested to have an impact on all students at school regarding healthier eating habits and quality of life and increased components of food HRAC. Moreover an impact was suggested regarding sustainable, public food sourcing strategies.</td>
</tr>
<tr>
<td>Adoption:</td>
<td>The participants were representative for the whole school, though academic subjects may vary (Math, Science, Home Economics, International Studies, Language, Media). More schools in the area applied for a LOMA program.</td>
</tr>
<tr>
<td>Implementation:</td>
<td>LOMA was implemented as planned for the whole school in at least a 10-year horizon. Some modifications are expected as part of the on going development of the school and the reform of the Danish Folkeskole.</td>
</tr>
<tr>
<td>Maintenance:</td>
<td>If funding is available, long-term effects will be pursued at both the individual and institutional level.</td>
</tr>
</tbody>
</table>
5.2 Local development of sustainable public food sourcing practices (SPFS)

Based on results from the exploratory and implemented stage of the LOMA foodscape there is convergent evidence that local development of SPFS has taken place. The LOMA intervention, regarded as the 'input' in the process of implementation, has had an impact both on outputs and outcomes in relation to SPFS. Among the outputs presented in table VI (page 50) the establishment of a production kitchen was a key-component in the logic model. Without such a professional kitchen it would not have been possible to buy fresh produce and non-processed food for preparations of 2-300 meals a day. This had great importance for the level of price, as processed food would always be more costly to purchase. Therefore, the kitchen was the catalyst factor for development of SPFS. This also included adequate physical space for cooling, freezing and working in the kitchen (to get an impression see video, Ruge 2015a).

Besides being a physical space for food production, the kitchen was also a socio-cultural space for learning and education – a ‘learning-scape’. In practice this meant that there was room in the kitchen for 10-15 students to participate in daily food preparations each day. Another implication was that the kitchen manager became a very central person in the LOMA foodscape. Due to her close relations to the food, the menu and her solid professional and pedagogical competences she turned out to be indispensable in the implementation of LOMA at NS. Findings indicated, that students regarded the practical production of healthy and tasty food in the LOMA kitchen as an instructive, meaningful and educational experience (cf. Paper III).

5.2.1 Public food procurement - SPFS

It was relevant to discuss the first results of the contracts with local suppliers in the light of SPFS and the aspiration to belong to the ‘Alternative Food Geography’ with reference to the physical and organisational space in the foodscape. Early records of food purchase for the first half part of 2014 were made available for this study and preliminary calculations indicated that the ‘organic’ share of total food purchases was app. 50% and that the 'local' share of total food purchases was app. 40%. It is reported from the kitchen manager, that seasonal variations should be expected: During spring and summer the 'local' share will probably increase due to higher availability of local products – both conventional and organic.

The implication for research of these findings is that subsequent data for the next years should be collected in order to measure the impact of SPFS on the long-term outcome measures (Pretty 2005). Such measurement has been applied by the Scottish parliament, regarding 'social return of investment' (SROI), which might be a useful evaluation method in future research12 (Gourlay 2008). Another measurement of sustainability - with reference to the precautionary principle (Brundtland 1987; EU 2014) – was the amount of groundwater that has been protected against meeting pesticides as an effect of the LOMA public food procurement strategies (the organic purchase). This could be calculated due to the purchase of organic food compared to yields pr. hectare and the average creation of sub-soil water under Danish arable land13.

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12 SROI : The Social Return on Investment of Food for Life School Meals in East Ayrshire, 2008
13 http://www.okocater.dk/forsiden/grundvand.aspx
A further development of the multilevel ‘logic model’ that Rayner and Lang (2013) suggested, might be a delivery from future research to capture the total ecological public health outputs and outcomes of LOMA.

Still in its infancy, outputs from LOMA have led to SPFS outcomes in the form of re-localisation of food chains (and shortening of food chains) between public school food procurement and local producers among whom some are organic farmers. Compared to other studies (Morgan and Sonnino; Wiskerke 2009; Roep and Wiskerke 2012) these findings may not come as a surprise with reference to previous cases of SPFS in other countries. One of the novelty values of the LOMA case was the fact, that this took place in a municipal, Danish context. Previously, short food chains between public school food systems and local producers were regarded as ‘impossible’ with reference to ‘restrictive EU legislation’ and the widespread tendency to centralisation and privatisation of public food procurement in Denmark (cf. Morgan and Sonnino 2008; Ruge and Mikkelsen 2012).

However, the Municipality of Svendborg showed how this could be accomplished for a school by dividing the call, including organic food, not exceeding the threshold and establishing educational links between local farmers and school. The implication for practice was, that this could be done at other schools too. Furthermore, that the application of a LOMA approach would make such efforts meaningful in a wider perspective of integrating health promotion, learning and sustainability in school foodscapes.

5.2.2 Educational links
In the socio-cultural space, participants in the LOMA CoP achieved a stronger, shared understanding of how the agreement with local suppliers could be used as a tool for sustainable food purchase and education. Furthermore, teachers achieved tangible knowledge about how they could utilise the ‘learning potential’ in these contracts with local producers. For instance, teachers organised excursions to organic vegetable growers, to a slaughterhouse, a fishmonger and a poultry farm. Furthermore local producers were invited as guest teachers on several occasions. There seemed to be a growing insight in some of the benefits of LOMA in terms of sustainability: the organic share, the low levels of food waste and the reduced transportation of food to the LOMA menu.

At NS, the dialogue and cooperation between the school, teachers, local farmers and suppliers was just initiated by the end of my study. But, within the coming years these first initiatives could lead to a closer links between education, school, farming, employment and thereby to social innovation in the area (EU Commission 2011, p.7). When the LOMA CoP ended, a new coordinating LOMA Group at NS was established to comply with the operational demands in everyday-life of the school. This group included teachers, the kitchen manager, school management and on an ‘ad-hoc’ basis the student council and some of the local farmers. A special activity for this group was to further explore and operationalize the link between students learning and the local food suppliers for LOMA.

In addition to the achievements of SPFS, the LOMA foodscape at NS also seemed to be a
useful frame for fulfilling the requirements of the new Danish School Reform\(^\text{14}\). The reform made a special request for educational activities that combined practice and theory and included connections with local enterprises in the educational activities. The implication of this for further research, would be to suggest an AR system with the aim of planning and monitoring the educational activities in ways that contributed to the improvement of:

- Students’ development of food and HRAC as learning outcomes - including self-orientation in ‘safe spaces’.
- Healthier eating habits.
- Implementation of the Danish School reform.
- Sustainable public food sourcing strategies

### 6.0 Conclusion

The aim of this dissertation was to provide answers to the research questions:

- “How did the LOMA school foodscape influence students’ development of food- and health related action competence (HRAC) and healthier eating habits?”
- “How did the LOMA school foodscape influence the development of methods that led to sustainable, local, public food sourcing practices (SPFS)?”

Despite the methodological weaknesses of the present study it was concluded that the LOMA school foodscape influenced students’ development of food and HRAC and healthier eating habits in a positive way through educational activities. The components of HRAC were regarded as basic building blocks in a healthy life-style and a democratic citizenship. Various forms of participation facilitated students’ development components of food and HRAC such as knowledge, insight, motivation, ownership, cooperation and critical thinking. Moreover, most students seemed to regard participation in LOMA as an attractive space for learning and self-orientation. This should be understood in the light of Ziehe’s emphasis on young peoples “counter-desires for stable relations, integration, support, community, normative clarity and fixed boundaries”. However, a special attention should be raised towards students that might find participation in LOMA too overwhelming, unpleasant and a negative experience.

The influence on students’ achievement of healthier eating habits was mainly due to a changed ‘setting’ and the introduction of a new meal-culture that included a shared meal (either LOMA food or packed lunch from home) for all students and their respective teachers each day in the week. Findings from focus-group interviews indicate, that students experienced ‘less hunger’ and better concentration in the afternoon lessons after this change. Reports from teachers about improved motivation for learning in afternoon lessons seem to support this finding, but further research is needed regarding this issue.

LOMA did not seem to have an impact on students’ apparently low expectations to current and future healthy life style. Students’ seemed to have the knowledge and to be

\(^{14}\) http://eng.uvm.dk
motivated, but they seem to find it hard to act upon this in their daily life in general. Students’ positive response towards the LOMA school foodscape may include their appreciation of an attractive structured space, where it is actually possible for young people to act in accordance to their health- and sustainability knowledge.

It was recommended that future LOMA educational activities should address this issue more directly through the integrated learning processes. In Ziehe’s words: “Attention should be directed to the ‘setting’ of learning processes in order to provide not only regulating functions but also supporting, meaning-generating and expressive impact”. In this study it was further concluded, that the needed capacity building among teachers should also include the potential benefits for students’ learning in the LOMA school foodscape as a health promoting setting.

In addition to students’ development of food and HRAC it was concluded that the LOMA school foodscape influenced the local development of SPFS in a positive way through the municipal contracts that were made regarding food procurement between school and local farmers. This has led to immediate outcomes such as contributions to re-localisation of food chains, shortening of food chains and an increased understanding of how school food can contribute to sustainable development and the importance of reduced ‘silo thinking’. Moreover, tangible knowledge has increased among teachers regarding the ‘learning potential’ of LOMA. When these outcomes were combined, they demonstrated how an ecological public health intervention could be implemented in practice. This single case study represented a unique case that demonstrated some of the benefits that an integrated approach to school foodscapes could offer in terms of health promotion, learning and sustainability.

It was an ambition of current study to contribute with ‘practical wisdom’ (cf. Flyvbjerg 2012) on how to address issues of health promotion, learning and sustainability in a school food context. By the end of the LOMA-foodscape journey, wisdom may seem too strong a word. Practical knowledge and insight might be a more appropriate way to talk about the results. There were indications of answers to the questions of ‘who gains?’ and ‘who looses?’ and ‘by which mechanisms of power?’ in this study. However, this could probably be answered more comprehensively in a couple of years. Then it will also be possible to investigate the long-term outputs and outcomes of the integrated LOMA foodscape at Nymarkskolen in Svendborg in the perspective of ecological public health.

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