Children’s Motivation and Interest Development in Science from Daycare to Upper Secondary School

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CHILDREN’S MOTIVATION AND INTEREST DEVELOPMENT IN SCIENCE FROM DAYCARE TO UPPER SECONDARY SCHOOL

As part of a larger national preparation of a science educational strategy in Denmark we conducted a literature review on Nordic research to inform the working group on the status on interest development and motivation among other topics. The review was conducted with a backward and forward snowball sampling methodology which revealed 230 papers in the category of motivation and interest development. The papers, keywords from papers and references were analysed through linguistic network mapping to identify network groups and sub-network groups. The analysis showed 2 major network groups and 13 and 9 sub-network groups respectively. These groups were analysed for common themes. Findings show that there are three distinct developments in the research literature when scaled along the educational system. First there is a tendency to change focus from interest towards motivation. Second there is a tendency in changing focus from curiosity towards relevance, and third there is a tendency to go from unisex research towards gender specific research. These findings are discussed as interest development vs. child development as the findings reveal areas for future focus of research in interest development in science education.

Keywords: Emotion, motivation, student interest

INTRODUCTION

Interest development and motivation is a key factor in the effort of and need for having more young people choosing careers within science

In 2016 a work was begun on recommendations for a national Danish science education strategy. As part of this work a large literature review was conducted. The aim of the review was to inform the working group on existing knowledge of four areas namely: i) student learning, ii) teachers educational competencies, iii) student motivation and interest and iv) student personalisation.

In this proposal the aims and results of the review on student motivation and interest is presented and discussed. The condition for the review was to capture the area from primary school to upper secondary school in the same study. The specific review question in the area of student motivation and interest was:

Which actions, methods and strategies can according to existing research develop students’ motivation and interest towards science, technology, and IT in day care and the educational system?

To answer the question a two-folded review process of identifying and analysing existing litteraure was carried out.

METHODOLOGY

Identifying literature

To identify existing research the method of back and forward snowball sampling was used (Webster & Watson, 2002). Here researchers within the area of interest development and motivation in science education provided the bibliography search group with keywords and key publications. From these a backward snowball sampling found references from key publications and with keywords. A forward snowball sampling revealed publications referring to the key publications. With this method in all 230 publications in Nordic research on interest development and motivation in science education was found.

Analysing literature
In order to analyse the large sample of literature a linguistic network analysis was conducted. This method was with inspiration from van de Wijngaert, Bouwman, & Contractor (2014). From this analysis several clusters of publications arose. The most significant clusters came up in two groups and with 13 and 9 subgroups respectively. These groups were analyses with thematic content analysis (Vaismoradi, Turunen, & Bondas, 2013). Furthermore an overall thematic analysis was conducted according the target level in the educational system.

All work on identifying literature and doing linguistic network analysis was carried out by a group of researchers responsible for all areas of the review while keyword and key publication mapping and the content analysis was conducted by author.

**FINDINGS**

The presented findings are from the analysis part. Findings came out as both thematic clusters and overall research foci.

**Thematic cluster analysis**

The thematic cluster analysis showed a large span of areas with Nordic research in interest development and motivation within science. Table 1 is an example of some of the themes from the analysis. Table 2 also shows that it was not possible to identify themes in all clusters.

Table 1. Examples of different thematic categories in clusters from linguistic network analysis

<table>
<thead>
<tr>
<th>Group level 1</th>
<th>Group level 2</th>
<th>Theme</th>
<th>Primary references</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>ROSE investigation</td>
<td>(Albrechtsen, 2009; Busch, 2005; Schreiner, 2006; Schreiner &amp; Sjøberg, 2012)</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>No clear theme in the group</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>Educational choice and IRIS investigation</td>
<td>(S. Andersson &amp; Chronholm, 2012; Bøe, 2012; Holmegaard, Madsen, &amp; Ulriksen, 2014; Ryder, Ulriksen, &amp; Bøe, 2015)</td>
</tr>
<tr>
<td>1</td>
<td>4</td>
<td>Educational methods and signs of interest</td>
<td>(Anderhag, 2014; Anderhag, Wickman, &amp; Hamza, 2015; Lavonen &amp; Laaksonen, 2009; Olsen &amp; Lie, 2011)</td>
</tr>
<tr>
<td>1</td>
<td>5</td>
<td>Stimulation and motion</td>
<td>(Bruun, 2009; Dahlgren &amp; Szczepanski, 2001; Wistoft &amp; Stovgaard, 2012)</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>Socio-scientific subjects and argumentation</td>
<td>(Ekborg, Ideland, &amp; Malmberg, 2009; Ekborg, Nyström, &amp; Ottander, 2009; Näs &amp; Ottander, 2008)</td>
</tr>
</tbody>
</table>

**Overall research foci**

The aim of the review was to get a picture of existing knowledge on interest development and motivation along the educational system. The identified literature was therefore analysed according to education level in which investigations was carried out.

This analysis uncovered a development of different foci (Figure 1). Three main developments were identified. First there is a change in focus with most research with younger children focusing on interest development while most research with elder children focus on motivation. Second there is a shift from curiosity towards relevance going from research with younger children to research with elder children. Finally the analysis also showed that while most research did not focus on gender with young children it is a general focus point when doing research on motivation and interest development with elder children.
DISCUSSION

The findings in the analysis show that research focus is dynamic according to educational level. It was found that young children have a tremendous curiosity towards science but such curiosity is difficult to transfer into learning science. A recommendation for stabilising such curiosity is to organise lessons more with an inquiry approach even that the teachers sometimes find such an approach difficult (van Uum, Verhoeff, & Peeters, 2016). As shown there is a broad range of approaches to researching interest development and motivation in the educational system, but especially the overall thematic analysis show that even there is research in all focus points at all levels in the educational system it may be worthwhile to reverse the findings and focus more on motivation, relevance and gender in day care and primary school and also focus more on interest development, curiosity and ignore gender when moving up in the educational system. Such approaches can reveal new insights to the area of motivation and interest development in science education and thereby be fruitful to inform practitioners, curriculum developers and researchers on how to build on children’s existing curiosity and interest towards science and to develop such approaches. A focus on the transitional stages in educational systems is recommended since it seems like much motivation and interest is lost in transition.

REFERENCES