

# Gender differences in the Orion Program: a study of the Science Center (De Magneet)



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# Content of the presentation

- Information about the Orion Program
- Research questions and method
- Study 1: background-question-results
- Study 2: background-question-results
- Study 3: background-question-results
- Conclusion



# Gender differences Science Center

<b>Overhead research questions</b>	<b>Methods</b>
Starting point of the schools	<ul style="list-style-type: none"> <li>• In-depth interview: differences in utterances men-women</li> </ul>
Learning environment <ul style="list-style-type: none"> <li>• Positive attitude educators?</li> <li>• Autonomy for boys and girls?</li> </ul>	<ul style="list-style-type: none"> <li>• Dast Attitude questionnaire: measurements attitude of</li> <li>• Video analyses : interaction</li> </ul>
Enthusiasm for S&T of boys and girls	<ul style="list-style-type: none"> <li>• Questionnaire Science Center for children: judgment of the visit</li> </ul>

# Gender differences Science Center

Overhead research questions	Methods
Starting point of the	Review: differences in -women  Study 1: Environment schools
Learning environment <ul style="list-style-type: none"> <li>• Positive attitude e</li> <li>• Autonomy for boy</li> </ul>	<ul style="list-style-type: none"> <li>• Dast Attitude questionnaire: attitude of</li> <li>• ... : interaction</li> </ul> Study 2: Environment Science Center-educators
Enthusiasm for S&T of boys and girls	<ul style="list-style-type: none"> <li>• Questionnaire Science Center judgment of the</li> </ul> Study 3: Environment Science Center-child

# Study 1: gender differences

## School environment

Implicit gender stereotypes and gender differences in scientific engagement are mutually reinforcing (Nosek, et al., 2009)

- Do respondents of Orion Schools refer more to men or women?
- Are these examples positive/neutral or negative?

# Results study 1: school environment

	Female Respondent (n=6)	Male Respondent (n=10)	Total per category
Positive or neutral quote about women in S&T context	4 (12%)	8 (24%)	12 (35%)
Critical about women in S&T context	2 (6%)	2 (6%)	4 (12%)
Positive or neutral quote about men in S&T context	10 (29%)	8 (24%)	18 (53%)
Critical about men in S&T context	0 (0%)	0 (0%)	0 (0%)
Total utterances men and women	16 (47%)	18 (53%)	34 (100%)

# Results study 1: school environment

	Female Respondent (n=6)	Male Respondent (n=10)	Total
com	4 (12%)	8 (24%)	12
Critical about women in S&T context	2 (6%)	2 (6%)	4 (12%)
Positive or neutral quote about men in S&T context	10 (29%)	8 (24%)	18
Critical about men in S&T context	0 (0%)	0 (0%)	0
Total utterances men and women	16 (47%)	18 (53%)	34

An engineering expert (man) came to school and we built bridges out of paper

Susan is responsible for the technology lessons at the moment

Amy teaches strictly according to the lines of the textbook, but she should be more spontaneous



# Study 2: attitude educators

## Science center environment

- Teachers' attitude towards science and technology is mostly negative (Palmer, 2004)
- Male teachers enjoy teaching S&T more than female teachers and ...
- Students' motivation can be stimulated positively by teacher's enthusiasm (Denessen, et al., 2011)
- A positive non-gender stereotype attitude is beneficial for children (Walma van der Molen, 2007)

- Do educators have a positive attitude that benefits a good S&T environment?
- Do men and women differ?

# Results study 2: attitude educators

	Women (n=9) Mean (ST DEV)	Men (n=3) Mean (STDEV)
Total attitude	3,2 (0,34)	3,6 (0,31)
Affective factors*	3,5 (0,47)	4,3 (0,33)
Difficulty*	2,3 (0,81)	1,4 (0,51)
Relevance	3,8 (0,59)	3,5 (0,42)
Gender stereotype	3,1 (0,78)	3,6 (0,53)
Perceived control**	3,1 (0,37)	3,6 (0,70)

\* Significant  $p < 0.05$  level

\*\* Significant  $p < 0.10$  level

# Study 2: autonomy children

## environment science center

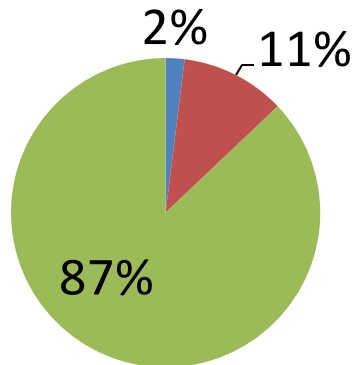
- Teachers who act as a coach with minimal interference and who offer children autonomy in their knowledge building, cause a significant positive attitude shift on pupil level (Cleynebreugel, Winter de, Buyse, Laevers, 2011)

- How much autonomy (in this case: time to speak) is being offered by the educators in order for children to express the thinking level or to ask questions?

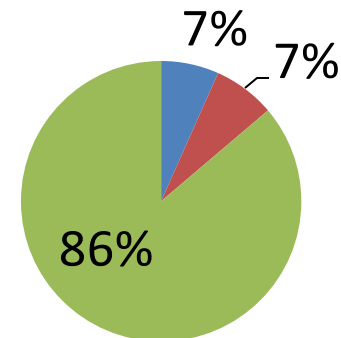
# Study 2: Results autonomy for children

Percentage time spent on speaking per person, educators with no Curious Mind experience

■ girl ■ boy ■ male educator



■ girl ■ boy ■ female educator

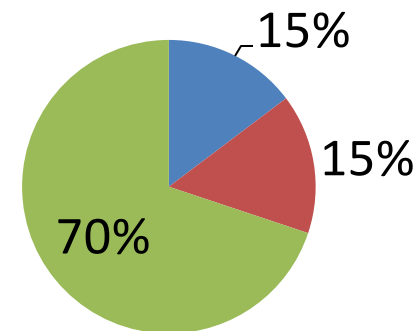


Before training in Curious Minds

# Study 2: Results autonomy for children

Percentage time spent on speaking per person, educators with Curious Mind experience

■ girl ■ boy ■ male educator



# Study 3: Enthusiasm of children

## Environment science center child

Gender differences in motivation are small, but tend to favor males in general, especially in physics (Steinkamp & Maehr, 1984; Andre, Whigham, Hendrickson & Chambers, 1997; Osborn, 2003)

- How enthusiastic were the children (5-6<sup>th</sup> grade) about the visit
- Do gender differences occur?

# Results study 3: enthusiasm children (5-6<sup>th</sup> grade)

	Girls (n=37)	Boys (n=30)
Rating visit	8,9	8,6
Affect, referring to the exhibits (%)	67%	64%

# Conclusion

Research questions	Conclusion
Starting point of the schools	S&T is associated more with men than women, mostly by female respondents
Learning environment <ul style="list-style-type: none"> <li>• Positive attitude educators?</li> <li>• Autonomy for boys and girls?</li> </ul>	<ul style="list-style-type: none"> <li>• Educators have a moderate positive attitude, but men are more positive</li> <li>• Most of the time the educator speaks. Curious Mind training might give girls and boys equal opportunity to speak</li> </ul>
Enthusiasm for S&T of boys and girls	<ul style="list-style-type: none"> <li>• Enthusiasm for science and technology in the science center is equally high for boys and girls</li> </ul>



# Conclusion

Research questions	Conclusion
Starting point	<p>more with men than female respondents</p>
<p>Learning environment</p> <ul style="list-style-type: none"> <li>• Positive attitude of educators?</li> <li>• Autonomy for boys and girls?</li> </ul>	<ul style="list-style-type: none"> <li>• Educators have a moderate positive attitude, but men are more positive than the educator speaks.</li> <li>• Career training might give girls and boys equal opportunity to speak</li> </ul>
Enthusiasm for S&T of boys and girls	<p>Enthusiasm for science and technology in center is equally high for boys and girls</p>

Study 1: Environment schools

Study 2: Environment Science Center-educators

Study 3: Environment Science Center-child

# Questions?

