Through the eyes of the teacher

# 1 Introduction

* wie wird Störung definiert

Managing classroom disruptions is a crucial aspect of effective classroom management (Evertson, Weinstein, et al. (2006); Kounin (2006)).

Accordingly, teachers must be able to quickly notice and appropriately react to significant events in the classroom. This ability is referred to as classroom professional vision (Goodwin (2015); Sherin (2007)).

The process of professional vision can be divided into two main aspects: focusing on relevant situations for learning and teaching (“noticing”) and applying knowledge to draw appropriate conclusions in these situations (“knowledge-based reasoning”; Seidel and Stürmer (2014)).

Therefore, the early visual perception of classroom disruptions is a key component to effectively maximize students’ learning time and minimize classroom interruptions. According to Kounin (2006), these important classroom management strategies are called “withitness” and “overlapping” and can be summarized under the concept of monitoring (Gold and Holodynski (2017)).

Learning to develop such classroom management skills is a demanding and complex task for student teachers (Wolff et al. (2016)). Research on teacher expertise showed that expert and novice teachers differ in their ability to perceive classroom events, “[…] whereas only a few studies have focused on the basal process of noticing, i.e. the recognition of possible disturbing situations” (Grub, Biermann, and Brünken (2020), p.75). Mobile eye-tracking data can fill this research gap by providing new insights in how expertise differences in teacher´s professional vision manifest in teacher-student interactions (Lachner, Jarodzka, and Nückles (2016); @Wolff et al. (2016)).

# 2 Research Questions

This study examined how the degree of teaching experience influences (a) the number of fixations on relevant areas (e.g., the student performing the disruption), (b) the fixation duration in relevant areas and (c) the time to first fixation on relevant areas, using mobile eye-tracking data in a controlled, micro-teaching setting. Based on the existing literature, we expect expert teachers to outperform novices by (H1) showing more fixations on relevant areas with (H2) shorter fixation durations and (H3) perceiving classroom disruptions faster (cf. Van den Bogert et al. (2014)).

# 3 Methods

We report how we determined our sample size, all data exclusions (if any), all manipulations, and all measures in the study.

## 3.1 Participants

The sample consists of *N* = 28 participants with *n* = 7 expert teachers and *n* = 21 novice teachers.

The inclusion criterion for experts was that they have successfully completed teacher training and are actively employed in the teaching profession. Novices were student teachers who have already successfully completed their first internship in a school and have gained one to four hours of teaching experience.

The subjects were primarily recruited through personal contacts, social media (facebook), e-mail distribution lists and advertising in lectures at the University Leipzig.

The expert teachers (18women, 62, 62, 62, 62, 71, 62, 62, 71, 71, 62, 62, 62, 62, 71, 62, 71, 62, 71, 62, 62, 71, 62, 62, 62, 62, 62, 62, 62%) had a mean age of 22, 24, 24, 23, 55, 23, 25, 56, 27, 23, 24, 23, 23, 59, 21, 36, 20, 38, 24, 25, 45, 24, 26, 21, 21, 27, 24, 23

The participants (98 women; 80%) had a mean age of 23.96 years (SD = 5.82; range: 18–48), and 13 of them (11%) reported to live together with their child/children. Whereas 21 participants (17%) lived alone, the remaining participants (n = 102; 83%) lived in a household consisting of 2–10 persons, with the majority (n = 93) living in a household of 2–4 persons. At baseline (July 2020), n = 10 participants (8%) reported flu-like symptoms with one participant being in COVID-related quarantine.

## 3.2 Material

## 3.3 Procedure

In June 2021, the study was piloted with student teachers volunteers to refine the study procedure. Data collection was conducted between July 2021, and July 2022.

## 3.4 Data analysis

All reported data analyses were conducted with the R (Version 4.1.2; R Core Team 2021) and the R-packages *ARTofR* (Version 0.3.3; Zhang 2021), *cowplot* (Version 1.1.1; Wilke 2020), *dplyr* (Version 1.0.8; Wickham et al. 2022), *forcats* (Version 0.5.1; Wickham 2021), *ggplot2* (Version 3.3.5; Wickham 2016), *gridExtra* (Version 2.3; Auguie 2017), *lubridate* (Version 1.8.0; Grolemund and Wickham 2011), *needs* (Version 0.0.3; Katz 2016), *papaja* (Version 0.1.0.9997; Aust and Barth 2020), *purrr* (Version 0.3.4; Henry and Wickham 2020), *readr* (Version 2.1.1; Wickham, Hester, and Bryan 2021), *readxl* (Version 1.3.1; Wickham and Bryan 2019), *stringr* (Version 1.4.0; Wickham 2019), *tibble* (Version 3.1.6; Müller and Wickham 2021), *tidyr* (Version 1.2.0; Wickham and Girlich 2022), *tidyverse* (Version 1.3.1; Wickham et al. 2019), *tinylabels* (Version 0.2.3; Barth 2022), *viridis* (Version 0.6.2; Garnier et al. 2021a, 2021b), and *viridisLite* (Version 0.4.0; Garnier et al. 2021b) and IBM SPSS 28. Data analysis scripts can be obtained from the authors upon request.

# 4 Results

# 5 Discussion

# 6 References

Auguie, Baptiste. 2017. *gridExtra: Miscellaneous Functions for "Grid" Graphics*. <https://CRAN.R-project.org/package=gridExtra>.

Aust, Frederik, and Marius Barth. 2020. *papaja: Prepare Reproducible APA Journal Articles with R Markdown*. <https://github.com/crsh/papaja>.

Barth, Marius. 2022. *tinylabels: Lightweight Variable Labels*. <https://cran.r-project.org/package=tinylabels>.

Evertson, Carolyn M, Carol S Weinstein, et al. 2006. “Classroom Management as a Field of Inquiry.” *Handbook of Classroom Management: Research, Practice, and Contemporary Issues* 3 (1): 16.

Garnier, Simon, Ross, Noam, Rudis, Robert, Camargo, et al. 2021a. *viridis - Colorblind-Friendly Color Maps for r*. <https://doi.org/10.5281/zenodo.4679424>.

———, et al. 2021b. *viridis - Colorblind-Friendly Color Maps for r*. <https://doi.org/10.5281/zenodo.4679424>.

Gold, Bernadette, and Manfred Holodynski. 2017. “Using Digital Video to Measure the Professional Vision of Elementary Classroom Management: Test Validation and Methodological Challenges.” *Computers & Education* 107: 13–30.

Goodwin, Charles. 2015. “Professional Vision.” In *Aufmerksamkeit*, 387–425. Springer.

Grolemund, Garrett, and Hadley Wickham. 2011. “Dates and Times Made Easy with lubridate.” *Journal of Statistical Software* 40 (3): 1–25. <https://www.jstatsoft.org/v40/i03/>.

Grub, Ann-Sophie, Antje Biermann, and Roland Brünken. 2020. “Process-Based Measurement of Professional Vision of (Prospective) Teachers in the Field of Classroom Management. A Systematic Review.” *Journal for Educational Research Online* 12 (3): 75–102.

Henry, Lionel, and Hadley Wickham. 2020. *Purrr: Functional Programming Tools*. <https://CRAN.R-project.org/package=purrr>.

Katz, Josh. 2016. *Needs: Attaches and Installs Packages*. <https://CRAN.R-project.org/package=needs>.

Kounin, Jacob S. 2006. *Techniken Der Klassenführung*. Waxmann Verlag.

Lachner, Andreas, Halszka Jarodzka, and Matthias Nückles. 2016. “What Makes an Expert Teacher? Investigating Teachers’ Professional Vision and Discourse Abilities.” *Instructional Science* 44 (3): 197–203.

Müller, Kirill, and Hadley Wickham. 2021. *Tibble: Simple Data Frames*. <https://CRAN.R-project.org/package=tibble>.

R Core Team. 2021. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. <https://www.R-project.org/>.

Seidel, Tina, and Kathleen Stürmer. 2014. “Modeling and Measuring the Structure of Professional Vision in Preservice Teachers.” *American Educational Research Journal* 51 (4): 739–71.

Sherin, MG. 2007. “The Development of Teachers’ Professional Vision in Video Clubs. Video Research in the Learning Sciences. R. Goldman, r. Pea, b. Barron and SJ Derry.” Mahwah, NJ, Lawrence Erlbaum.

Van den Bogert, Niek, Jan van Bruggen, Danny Kostons, and Wim Jochems. 2014. “First Steps into Understanding Teachers’ Visual Perception of Classroom Events.” *Teaching and Teacher Education* 37: 208–16.

Wickham, Hadley. 2016. *Ggplot2: Elegant Graphics for Data Analysis*. Springer-Verlag New York. <https://ggplot2.tidyverse.org>.

———. 2019. *Stringr: Simple, Consistent Wrappers for Common String Operations*. <https://CRAN.R-project.org/package=stringr>.

———. 2021. *Forcats: Tools for Working with Categorical Variables (Factors)*. <https://CRAN.R-project.org/package=forcats>.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D’Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. “Welcome to the tidyverse.” *Journal of Open Source Software* 4 (43): 1686. <https://doi.org/10.21105/joss.01686>.

Wickham, Hadley, and Jennifer Bryan. 2019. *Readxl: Read Excel Files*. <https://CRAN.R-project.org/package=readxl>.

Wickham, Hadley, Romain François, Lionel Henry, and Kirill Müller. 2022. *Dplyr: A Grammar of Data Manipulation*. <https://CRAN.R-project.org/package=dplyr>.

Wickham, Hadley, and Maximilian Girlich. 2022. *Tidyr: Tidy Messy Data*. <https://CRAN.R-project.org/package=tidyr>.

Wickham, Hadley, Jim Hester, and Jennifer Bryan. 2021. *Readr: Read Rectangular Text Data*. <https://CRAN.R-project.org/package=readr>.

Wilke, Claus O. 2020. *Cowplot: Streamlined Plot Theme and Plot Annotations for ’Ggplot2’*. <https://CRAN.R-project.org/package=cowplot>.

Wolff, Charlotte E, Halszka Jarodzka, Niek van den Bogert, and Henny Boshuizen. 2016. “Teacher Vision: Expert and Novice Teachers’ Perception of Problematic Classroom Management Scenes.” *Instructional Science* 44 (3): 243–65.

Zhang, Huanyuan. 2021. *ARTofR: Who Ever Care about the [Art of r] Scripts?* <https://CRAN.R-project.org/package=ARTofR>.