Teacher Sharing Classroom (TSC) program for *Asas Sains Komputer* (ASK) Educators: A Pilot Study on Advancing Education Digitization in Perak

Mohd Norzaini bin Mohd Zain, Najihah binti Mustaffa*, Nurmazura binti Mohamad Yunus, Amjad Anas bin Abd Malek, Safuan bin Haji Raba'ai.

Sektor Pembelajaran, Jabatan Pendidikan Negeri Perak, Perak, Malaysia
*corresponding author: najihah.mustaffa@moe.gov.my
Received: 19 November 2024; Accepted: 26 December 2024

Abstract

Nowadays, teachers need knowledge and skills to strengthen the quality of teaching and learning for students' achievement. However, there are teachers who are novice teachers (mentee teachers) due to non-teaching options or lack of experience in teaching *Asas Sains Komputer* (ASK) subjects. In addition, constraints in terms of location and time cause mentee teachers to lack exposure and knowledge sharing from expert and experienced teachers (mentor teachers). Therefore, this study aims to improve the skills of mentee teachers in teaching and learning in the subject of *ASK* through a co-teaching approach. The Teacher Sharing Classroom (TSC) program is a teaching and learning sharing program of Mentor Teachers from other schools to mentee teachers from other schools that is implemented online using a co-teaching approach. This study was carried out quantitatively to 30 schools of mentee teachers who taught in Form 1, Form 2 and Form 3 and there are three mentor teachers. The findings showed that through the co-teaching method, it provides new knowledge to the mentee teacher. The worksheets and materials that have been used by the mentor teacher gave the mentee teachers a new idea to plan teaching and learning lessons for topics and understand difficult topics. In addition, the mentor teacher's questioning technique can stimulate students to actively engage in teaching and learning sessions in the classroom. In conclusion, this study provides a platform for mentee teachers and mentor teachers to exchange opinions and share teaching and learning techniques and strategies with each other. The study also supports the digital education policy where this study uses new methods for future education.

Keywords: Co-teaching, *Asas Sains Komputer*, National Digitization Policy, Mentor Teacher, Mentee Teacher, Technology

Introduction

Background

Nowadays, the country is driving towards growth in the digital economy and meeting the demands of the job market based on the Industrial Revolution 4.0. Yet, the conventional way of teaching by copying notes and face-to-face lecture sessions may be less effective specifically with the existence of new technologies that have developed into the lifestyle of today's generation. The country's education system requires us to take steps forwards to the digital technology-driven field, which are more interactive and flexible. The Malaysian Education Development Plan (2013-2025) mentioned Information and Communication Technology (ICT) in education which is in Wave 3 (2021-2025): Defining future infrastructure requirements. The Ministry aims to ensure that students learn using ICT and effectively enhance their learning. The Honorable Minister of Education also emphasized the main seven pillars in education to ensure that the various initiatives provided will be maintained and improved as needed. In order to realize the slogan "Happy Students, Happy Teachers, Well-educated Schools and a Prosperous Nation", the Ministry of Education (MOE) emphasizes the 7th core. This 7th core is to develop the digital education capability in schools by engaging with central agencies. This is to enhance the digital education capability in educational institutions MOE. Hence, educators are required to equip themselves with ICT knowledge to prepare them to face the challenges of Industrial Revolution 4.0.

The educators are required to understand that the latest technology is to strengthen teaching and learning sessions (T&L) to implement a plan that has been planned by the government or the ministry. Various agendas and frameworks in the digital aspect are being streamlined and improved continuously. Although the current generation is considered digital native, the fact is that digital skills are still less able to provide encouraging productivity. This situation shows that there is a lack of emphasis on developing digital capital through digital education (Ayob et al., 2021). In addition, to strengthen the quality of teaching and learning, teachers are required to be proficient in the subjects taught. Inexperienced teachers will have an impact on students' achievement (Darlis et al., 2023).

Problem Statement

Teacher's reward or moral support is an important aspect in attracting interest and to increase students' understanding of a topic. Based on previous studies, the quality of teaching is an important aspect in attracting interest and to increase students' understanding of a topic. Many factors influenced students' academic achievement, including the T&L method that has been practiced by teachers in the classroom.

Based on a data survey on January 31, 2023 of ASK teachers of Perak state shows that there are quite difficult topics for the teachers to deliver in class during T&L for Form 1, 2, and 3. Subtopics for Form 1; Learning Standard 2.16 which combines the skills of addition and subtraction operations of binary numbers in translating ASCII encoding characters is 91.20% is difficult, subheading Form 2; Learning Standard 1.24 which is producing a program that involves a combination of various control structures is 90.90%.

While the sub-heading Form 3; Learning Standard 2.16 which is to produce cipher methods to solve problems in everyday life is 89.20%.

Based on the findings of the survey on 31 Jan 2023, there are 23.33% of non-optional teachers teaching ASK subjects. In addition, these teachers are also not experts in teaching certain topics and demand for the guidance from more experienced teachers to teach effectively. T&L sessions are able to be implemented effectively even though the students are in the class and in large numbers (Dieker, 2001; Gallo-Fox & Scantlebury, 2015; Roth & Tobin, 2004; Weilbacher & Tilford, 2015, Sebald et al., 2023). In addition, teachers also gain constraints to move to specialist teachers' schools in terms of time, energy and cost. Therefore, to overcome this problem, the proposed approach is co-teaching. The study shows that the lack of knowledge about co-teaching causes one of the constraints to the development of the co-teaching approach teaching (Murawski, 2006; Sirkko, 2018; Takala & Uusitalo-Malmivaara, 2012) which has an impact on education. While previous quantitative studies have findings about student achievement and perceptions about the co-teaching model (Szumski et al., 2017; Bottge et al. 2015; Hang and Rabren 2009). Based on previous qualitative studies emphasizing the students' perception of the co-teaching model, students' learning and the teacher's role, however the number of participants in this study is small numbers of participants (Strogilos and King-Sears 2019; Keeley et al., 2017; Embury and Kroeger 2012).

This study focuses on the role of teachers in the implementation of co-teaching to improve the skills of mentee teachers in T&L subject of ASK. This co-teaching approach is able to increase the ratio of teachers to students and improve the teaching of a teacher as well as increase the involvement of students in a T&L session. In addition, co-teaching also emphasizes the teacher's competence and the skills of two different teachers are able to give benefit to all students. Embury and Kroeger (2012) and Gardesten (2023) determined that this co-teaching model gives meaning to the equality of status and power between the two teachers to save time and energy due to this co-teaching approach being able to be applied digitally.

Data and digital technology are considered as driving forces of teaching innovation parallel with the digital transformation of education. A teacher who is data literate and competent in digital teaching is pivotal to empower a student's digital capacity, ethical use of technology and collaboration or communication skills in the classroom (Lin et al., 2023).

Focus Study - Selection of focus study

All ASKs' teachers were given a google form survey form on January 31, 2023. The researcher chose the topic that was the most difficult for the teacher to teach for the implementation of this study. Teachers are categorized into two categories, namely the group of teachers who mentioned that the topics are difficult and the group of teachers who mentioned the topics are easy based on the results that have been determined. The category of teachers who mentioned that the topic was difficult was selected by a total of 10 teachers from different schools while the teachers who mentioned the topic was easy were filtered by researchers to plan in terms of teachers' teaching. These teachers are categorized based on their answers in the survey form that has been distributed.

Initial data collection

The data were obtained through a google form to determine the teacher's category. While the teachers' interview session about teaching experience, teacher options and topics online was held after identifying the teacher's characteristics by category.

Implementation Planning of Action Research

The conception of this TCS idea arose when the researcher observed that many ASK teachers expressed difficulties in teaching the ASK subject. The researcher has employed Computational Thinking Techniques to address this issue. Computational Thinking, recognized as a tool for problem-solving processes that involve breaking down problems into smaller components, extracting important related ideas, and identifying patterns for systematic and effective solution design with no information overlap (Saidin et al., 2021).

Computational Thinking Techniques

The researcher categorized the Computational Thinking Techniques into four categories: Decomposition Technique, Pattern Recognition Technique, Abstraction Technique, and Algorithm Design Technique.

a) Decomposition Technique:

The researcher conducted a survey of 234 ASK teachers in the state of Perak.

b) Pattern Recognition Technique:

The researcher classified:

i) Topics that are difficult and easy to teach.
ii) Teachers who selected difficult and easy topics for instruction.

c) Abstraction Technique:

i) The researcher eliminated topics that are easily taught by teachers.
ii) The researcher selected topics that are difficult to teach by teachers for resolution.

d) Algorithm Design Technique:

The researcher developed plans and steps to address the problem.

i) The TSC program was designed to address the problem.
ii) The researcher found that teachers who possess knowledge of ASK subject content lack exposure to teaching methods and activities that can engage students and enhance their understanding.

Co-teaching

Schools are required to be equipped with teaching and learning plans by teachers to strengthen and improve students' achievement in school. One approach that has been known is co-teaching (Murawski and Dieker, 2004; Villa et al., 2004). There are various definitions to describe the co-teaching approach. Co-teaching is defined as two or more people sharing the responsibility of teaching some or all of the students in the classroom. It involves the distribution of responsibilities among teachers to plan, give instructions and evaluate students in the classroom (Villa et al., 2008). The teachers involved in the

implementation of co-teaching are responsible for planning, delivering, evaluating student achievement and class management. Friend and Cook (2007) further expand the definition of co-teaching which is when two or more professionals join together to deliver substantive teaching to a diverse group of students and join together in one physical space. This is stated more clearly: the definition of co-teaching is two or more people who are professional and recognized accordingly.

The definition of co-teaching is applied in various ways and there are several definitions that describe the types of teaching such as collaborative teaching, team teaching, paired teaching and paired teaching. While for this study, the researcher refers to a collaborative effort between two or more people in the same discipline, participating fully in all teaching elements, including teaching design, in giving instructions and evaluation before, during and after the teaching session. Teachers who teach after other teachers teach in the same class and make decisions are not included in this definition (Haag et al, 2023).

The challenge for experienced teachers to implement a teaching model with practicum teachers requires experienced teachers who are willing and able to implement co-teaching while teaching students in the classroom (Sebald et al., 2023). This study focuses on the implementation between experienced teachers and inexperienced teachers. This aims to improve the quality of competence of teachers who have been recognized by the Ministry of Education and also non-option teachers. This study was carried out for ASK teachers based on the results of a researcher's survey that mentioned the topics were difficult in the ASK subject.

Developing The Teaching and Learning Skills of Teachers

ASK is introduced at the primary level to enable students to become individuals capable of computational thinking. The ASK subject teaches students to shape their thinking, generate logical thoughts, analyze, formulate, structure, and seek problem solutions using specific techniques - all of which are valuable skills that underpin and drive the digital economy. To cultivate computationally minded students, teachers need to be equipped with quality approaches, strategies, and knowledge.

Previous studies have indicated that the way teachers engage in co-teaching approaches facilitates mutual learning as a form of professional development (Strogilos et al., 2023).This study employed an action research design that applies Kemmis and McTaggart's (1988) model. Kemmis and McTaggart (1988) explained that for some groups already planning actions, they can initiate the first step as suggested by Lewin's model. However, they argued that most groups would commence with the initial reconnaissance stage to reflect on a particular situation as a foundation for planning and taking action. This model is illustrated in Figure 1.

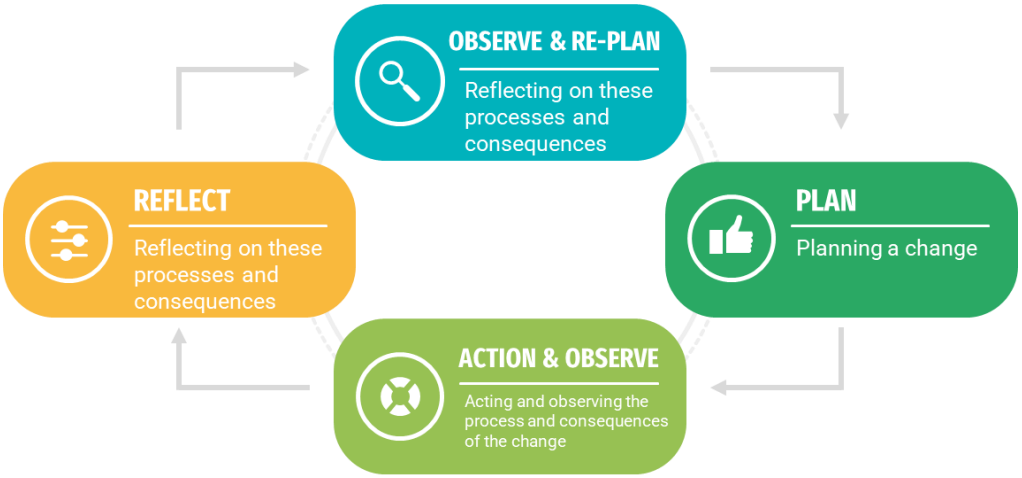

Figure 1: Model of Kemmis and Mc Taggart (1998)
(Kemmis & McTaggart, 1988)

This action research began with a reflection process conducted by the researcher. Weaknesses in the teaching and learning of ASK topics, particularly challenging subjects for teachers, were identified. The reflection process was conducted because the researcher needed to understand both difficult and easy topics for ASK teachers in Perak. Surveys were conducted among ASK teachers to identify topics they considered difficult and easy to teach in the classroom. These weaknesses were identified based on the conducted surveys. Consequently, the researcher categorized teachers into mentor teachers and mentee teachers and identified challenging topics for teaching.

After the reflection process, the researcher planned to address the issue of difficult topics based on the constraints faced by ASK teachers in Perak. The co-teaching approach was identified as a means to reduce the problems faced by these teachers. Therefore, the researcher, together with the group responsible for digitization, planned to assist in implementing co-teaching through a hybrid approach. The implementation of co-teaching was carried out according to the grade levels, namely Grade 1, Grade 2, and Grade 3, by mentor teachers. The researcher and the group observed and monitored the implementation in the classroom.

Following the monitoring activities conducted in the classroom, the researcher reflected on this study to address the issues with appropriate improvements and also planned for follow-up actions.

Research Objective and Research Question
Research Objective
The objective of this study is to enhance the skills of mentor teachers in teaching and learning ASK through the co-teaching approach.

Research Question
How can mentor teachers improve the skills of mentee teachers in teaching and learning ASK through the co-teaching approach?

Research Limitation
This study is conducted with selected ASK teachers based on predefined categories. It does not encompass all teachers in the country, particularly those in the state of Perak. Therefore, the findings of this study cannot be generalized to the broader context of co-teaching approaches.

Methodology

In this research a quantitative method. The participants in this study consist of 10 teachers who teach Form 1, 10 teachers who teach Form 2, and 10 teachers who teach Form 3. There is a total of 30 ASK teachers from different schools involved in this study. These teachers are categorized as mentee teachers because, based on a previous survey, they indicated that the selected topics were challenging to teach. Three mentor teachers were also selected, comprising one teacher who teaches Form 1, one teacher who teaches Form 2, and one teacher who teaches Form 3. These mentor teachers were chosen based on the survey, as they found the topics selected by the 30 mentee teachers to be easy. Additionally, seven teachers who do not teach ASK were part of the 30 mentee teachers involved in this study. The 30 mentee teachers have less than seven years of teaching experience. The highest grade level among them is DG48, with a total of 9 teachers holding this rank. This study was conducted in three selected mentor teacher schools. Mentor teachers are expert educators who serve as references for mentee teachers. Thirty mentee teachers were involved from these thirty schools. This research was carried out in three different mentor teacher schools, each with 30 mentee teachers from distinct schools.

The study was executed in collaboration with the Technical Team, specifically the *Unit Sumber Teknologi Pendidikan* (USTP) officers, to prepare technical resources. The research commenced by providing guidance and engaging in discussions with mentor teachers to enhance the T&L. The guidance provided included the development of Daily Lesson Plans and instructional materials by mentor teachers. Mentor teacher guidance was delivered through both virtual and face-to-face interactions. This implementation took place directly within the mentor teacher schools, where mentor teachers conducted Pedagogy with their students, while mentee teachers engaged in co-teaching, alongside their students, to observe mentor teachers' pedagogy. This co-teaching approach was adopted to address constraints related to time and location for mentee teachers, enabling them to witness mentor teachers' exemplary pedagogy.

Data Collection Methodology
Mentee teachers provided reflections on the T&L they have participated in using a reflection form. This data aims to elicit reflections from mentee teachers regarding the suitability of the methods, instructional materials, and worksheets employed by mentors for the chosen topics.

Data Analysis Approach

The findings are obtained subjected to quantitative analysis using a Google Form survey. The Google Form survey is designed by the research and validated by the expertise of this subject matter. This Google Form employs a 4-point Likert scale, which includes "Strongly Disagree," "Disagree," "Agree," and "Strongly Agree." As the scale does not incorporate a neutral point, with odd-numbered scaling (4-point Likert), respondents are compelled to make a choice, even if they may hold uncertain opinions (Croasmun & Ostrom, 2011). Meanwhile, the collected data has undergone descriptive analysis, expressed as percentages for each skill through the reflections of mentee teachers. The data was analyzed using percentage from the data of the google form. The percentage is used to evaluate extensive data and hence presents an accurate value. In this research, the percentage indicates the major elements that are required regarding the research objective. The data was analyzed manually through excel.

Results and Discussion

Co-Teaching, Enhancement of Teacher's Teaching and Learning Skills

The findings of this study indicate that the co-teaching method imparts new knowledge. According to the survey of mentee teachers, 69% agreed, while 31% strongly agreed that the program provided them with new knowledge. Similarly, the instructional materials, such as worksheets employed by mentor teachers, offered valuable insights for mentee teachers in planning their teaching and learning session. The survey results show that 62% agreed, and 38% strongly agreed that the worksheets used by mentor teachers provided them with new ideas for designing their teaching and learning session for the relevant topics. Furthermore, the materials utilized by mentor teachers aided students in comprehending challenging topics. Additionally, the questioning techniques employed by mentor teachers stimulated student engagement in their teaching and learning process within the classroom.

Co-teaching is employed as a positively-oriented instructional model in learning, engagement, and the social climate (Rönn-Liljenfeldt et al., 2023a & 2023b; Jurkowski et al, 2023). The implementation of co-teaching has proven beneficial for teachers, providing support, relief, and professional development due to its diverse expertise (Jurkowski et al., 2023).

The studies on co-teaching conducted within this research reveal that co-teaching is indeed a suitable alternative for the contemporary student environment. The co-teaching method should be integrated into the teaching and learning process in Malaysia as it facilitates the design and execution of more effective instructional activities by teachers (Ariffin & Janan, 2017). Furthermore, students find it easier to grasp specific topics due to more meaningful pedagogy (T&L). Co-teaching can foster a positive, high-quality learning experience and have an impact on the professional development in the field of Computer Science (Piech et al., 2020).

This study is corroborated by prior research, which asserts that the involvement of teachers in co-teaching approaches facilitates mutual professional development (Carty & Farrell, 2018; Rytivaara & Kershner, 2012; Strogilos et al. 2023). This is due to mentor teachers applying their knowledge based on teaching experience in line with their individual teaching styles, which are tailored to the specific student context in their respective schools.

Carty & Farrell (2018) argue that mentee teachers could observe various methods for explaining mathematical concepts and are exposed to different teaching styles, which they can apply in the process of teaching and learning. However, mentee teachers need to be well-prepared with the content of teaching and learning in order to guide their students effectively. This condition also serves as a preparatory step that aids in the professional development of the mentee teachers**.**

Summary, Reflection and Recommendations

In general, the role of teachers can be optimized when educators become more creative and critical in delivering knowledge to their students. Consequently, teachers should contemplate various strategies and new approaches to align their practices with the requirements of students in this era of globalization. As a result, the most practical platform for this adaptation is through the implementation of action research to enable teachers to enhance their teaching competency, making teaching and learning process in the classroom more effective and meaningful.

It is evident that teacher creativity and effective classroom management are critical tasks that necessitate knowledge, skills, patience, and optimal commitment to achieve maximum impact. Accurate preparation enables the smooth and meaningful execution of teaching and learning.

Co-teaching is an approach that supports quality and enhances sustainability in the teaching profession (Sebald et al., 2023). This approach equips teachers with the ability to impart knowledge, fosters enthusiasm for teaching students, addresses issues, and provides support to all students in the classroom with their existing skills. However, these teachers are influenced by various elements that can contribute to the cultivation of relationships within the classroom (Tsaganou, 2023).

Conclusion

Co-teaching is an extensively studied alternative teaching method in which two teachers collaboratively plan, implement, and assess instruction for students effectively without any shortcomings. This approach also aligns with the theory of Social Constructivism, emphasizing the connection between individuals and guidance towards individual learning. Through co-teaching, individuals share and construct new knowledge.

One limitation of this study pertains to technical issues. A future suggestion is to establish USTP teams for other subjects. Additionally, it is recommended to implement

this program for other subjects, such as the creation of hybrid classes. Thus, the study also supports the digital education policy, as it employs novel methods for future education. Future education requires highly creative teachers to deliver engaging pedagogy in line with students' cognitive development and digital technology. Therefore, this program serves as a platform for both teachers and students to observe the pedagogy process employing different methods and materials by more skilled mentor teachers. Mentor teachers employ effective questioning techniques, making students active learners and creating a more enjoyable learning atmosphere.

Acknowledgment
The researcher expresses profound gratitude to the mentor teachers and mentee teachers who contributed to the success of this study, as well as all those directly or indirectly involved in this research. The researcher also extends gratitude to Mr. Haji Ahmad Lutfi bin Abu Bakar for supporting the implementation of this study. Additionally, the researcher acknowledges the Technical Team, specifically the Educational Technology Resource Unit (USTP).

Financial Support
This study did not receive any financial assistance from any party.

Conflict of Interest
The researcher reports no conflicts of interest related to the research, authorship, or publication of this study.

References
Ayob, N. H., Hamzah, I. S. and Aziz, M. A. (2021). Merapatkan jurang digital dalam pendidikan: Dasar dan strategi di Malaysia. *J. Tour. Hosp. Environ. Manag*, *6*, 157-170.

Ariffin, N. A. and Janan, D. (2017). Keberkesanan Kaedah Pengajaran Bersama Dalam Meningkatkan Pencapaian Penulisan Karangan Murid Tingkatan 4: The Effectiveness of Coaching Teaching Methods in Improving Writing Achievement of Form 4 Students. *PENDETA*, *8*, 59-65.

Bottge, B. A., Toland, M. D., Gassaway, L., Butler, M., Choo, S., Griffen, A. K. and Ma, X. (2015). Impact of enhanced anchored instruction in inclusive math classrooms. *Exceptional Children*, *81*(2), 158-175.

Croasmun, J. T. and Ostrom, L. (2011). Using likert-type scales in the social sciences. *Journal of adult education*, *40*(1), 19-22.

Carty, A. and Marie Farrell, A. (2018). Co-teaching in a mainstream post-primary mathematics classroom: an evaluation of models of co-teaching from the perspective of the teachers. *Support for learning*, *33*(2), 101-121.

Darlis, A., Alwi, H., Hasibuan, B., Syuhada, M. A. and Miftahuljannah, V. (2023). Inovasi Kurikulum dan Peningkatan Profesionalitas Guru. *Mimbar Kampus: Jurnal Pendidikan dan Agama Islam*, *22*(2), 473-479.

Dieker, L. A. (2001). What are the characteristics of “effective” middle and high school co-taught teams for students with disabilities?. *Preventing School Failure: Alternative Education for Children and Youth*, *46*(1), 14-23.

Embury, D. C. and Kroeger, S. D. (2012). Let's Ask the Kids: Consumer Constructions of Co-Teaching. *International Journal of Special Education*, *27*(2), 102-112.

Friend, M. and Cook, L. (2007). Co-teaching. *Educational leadership*, *64*(5), 48-52.

Gallo-Fox, J. and Scantlebury, K. (2015). “It isn’t necessarily sunshine and daisies every time”: coplanning opportunities and challenges when student teaching. *Asia-Pacific Journal of Teacher Education*, *43*(4), 324-337.

Gardesten, M. (2023). How Co-Teaching May Contribute to Inclusion in Mathematics Education: A Systematic Literature Review. *Education Sciences*, *13*(7), 677.

Haag, K., Pickett, S. B., Trujillo, G. and Andrews, T. C. (2023). Co-Teaching in undergraduate STEM education: a lever for pedagogical change toward evidence-based teaching?. *CBE—Life Sciences Education*, *22*(1), es1.

Hang, Q. and Rabren, K. (2009). An examination of co-teaching: Perspectives and efficacy indicators. *Remedial and special education*, *30*(5), 259-268.

Jurkowski, S., Ulrich, M. and Müller, B. (2023). Co-teaching as a resource for inclusive classes: teachers’ perspectives on conditions for successful collaboration. *International Journal of Inclusive Education*, *27*(1), 54-71.

Keeley, R. G., Brown, M. R. and Knapp, D. (2017). Evaluation of the student experience in the co-taught classroom.

Kemmis, S. and McTaggart, R. (1988). The action research planner . Geelong, Australia.

Lin, R., Yang, J., Jiang, F. and Li, J. (2023). Does teacher’s data literacy and digital teaching competence influence empowering students in the classroom? Evidence from China. *Education and Information Technologies*, *28*(3), 2845-2867.

Murawski, W. W. and Dieker, L. A. (2004). Tips and strategies for co-teaching at the secondary level. *Teaching exceptional children*, *36*(5), 52-58.

Murawski, W. W. (2006). Student outcomes in co-taught secondary English classes: How can we improve?. *Reading & Writing Quarterly*, *22*(3), 227-247.

Piech, C., Yan, L., Einstein, L., Saavedra, A., Bozkurt, B. and Sestakova, E. (2020). Co-teaching computer science across borders: Human-centric learning at scale. In *Proceedings of the Seventh ACM Conference on Learning@ Scale* (pp. 103-113).

Rönn-Liljenfeldt, M., Sundqvist, C., Ström, K. and Korhonen, J. (2023a). Students' perceptions of co-teaching in the general classroom. *European Journal of Special Needs Education*, 1-16.

Rönn-Liljenfeldt, M., Sundqvist, C. and Ström, K. (2023b). Between vision and reality: Finnish school leaders' experiences of their own and teachers' roles in the development of co-teaching. *Scandinavian Journal of Educational Research*, 1-14.

Roth, W. M. and Tobin, K. (2004). Coteaching: From praxis to theory. *Teachers and teaching*, *10*(2), 161-179.

Rytivaara, A. and Kershner, R. (2012). Co-teaching as a context for teachers' professional learning and joint knowledge construction. *Teaching and teacher education*, *28*(7), 999-1008.

Saidin, N. D., Khalid, F., Martin, R., Kuppusamy, Y. and Munusamy, N. A. (2021). Benefits and challenges of applying computational thinking in education. *International Journal of Information and Education Technology*, *11*(5), 248-254.

Sebald, A., Myers, A., Frederiksen, H. and Pike, E. (2023). Collaborative co-teaching during student teaching pilot project: what difference does context make?. *Journal of Education*, *203*(1), 18-31.

Sirkko, R., Takala, M. and Wickman, K. (2018). Co-teaching in northern rural Finnish schools. *Education in the North*.

Strogilos, V. and King-Sears, M. E. (2019). Co-teaching is extra help and fun: perspectives on co-teaching from middle school students and co-teachers. *Journal of Research in Special Educational Needs*, *19*(2), 92-102.

Strogilos, V., King-Sears, M. E., Tragoulia, E., Voulagka, A. and Stefanidis, A. (2023). A meta-synthesis of co-teaching students with and without disabilities. *Educational Research Review*, *38*, 100504.

Szumski, G., Smogorzewska, J. and Karwowski, M. (2017). Academic achievement of students without special educational needs in inclusive classrooms: A meta-analysis. *Educational research review*, *21*, 33-54.

Takala, M. and Uusitalo-Malmivaara, L. (2012). A one-year study of the development of co-teaching in four Finnish schools. *European journal of special needs education*, *27*(3), 373-390.

Tsaganou, A. E. (2023). Exploring co-teaching through teachers' perspective in primary education in Greece.

Villa, R., Thousand, J. and Nevin, A. (2004). *A guide to co-teaching: Practical tips for facilitating student learning.* Thousand Oaks, CA: Corwin Press.

Villa, R. A., Thousand, J. S. and Nevin, A. (2008). *A guide to co-teaching: Practical tips for facilitating student learning* (Vol. 2). Thousand Oaks, CA: Corwin Press.

Weilbacher, G. and Tilford, K. (2015). Co-Teaching in a Year-Long Professional Development School. *School-University Partnerships*, *8*(1), 37-48.