

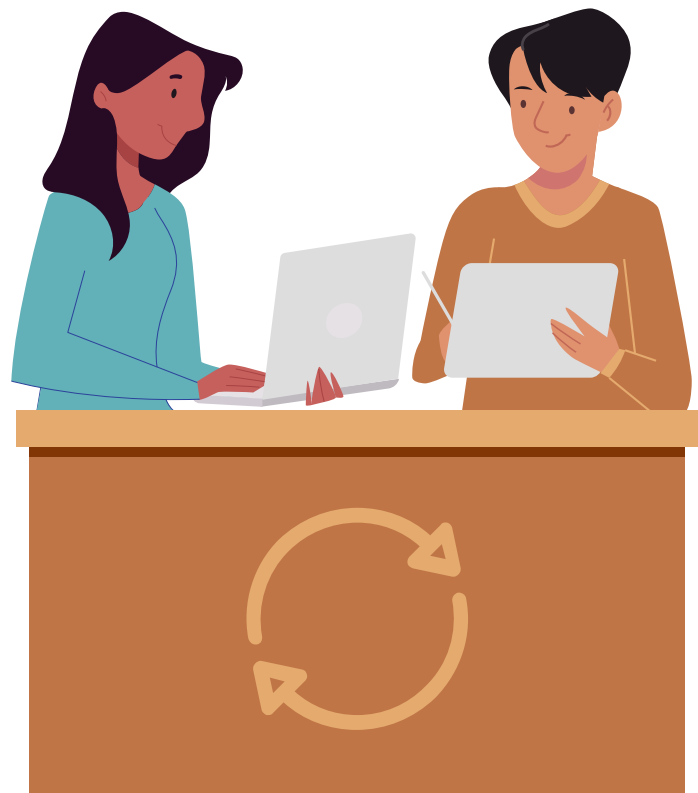


Reconsidering the Share of a Think–Pair–Share: Emerging Limitations, Alternatives, and Opportunities for Research

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Some History

- Created in 1981 by professor Frank Lyman
- Promoted in general education for the past 20 years
 - Demonstrated some positive effects in CS courses (Kothiyal et. Al 2013, 2014 papers)



What is Think-Pair-Share (TPS)?

Pair

Give students the chance to share answers and ideas with a neighbour/small group

Think

Give students times to come up with their own response.

Share ?

Give a few students the chance to share with the whole class what was discussed



Paper Objective

Reconsider the necessity, impact and assumptions behind the share of TPS



6 Different Assumptions

About benefits of share

1



Challenges to these Assumptions

Supported by evidence

2



Proposed Changes to the Share

Including elimination

3

Paper Structure

Assumption 1

The share is an effective way for me to figure out what students are thinking so I can adjust to their needs

Challenges:

- Whole group discussions failed to capture richness of small-group discussions¹
 - ◆ Gives instructor a skewed view of the class
 - ◆ Argues that this may exacerbate inequalities



Footnotes:

1. Ernest et al., 2019, Hsi and Hoadley, 1997; Eddy et al., 2014; Ballen et al., 2019; Aguilon et al., 2020; Bailey et al., 2020

Assumption 2

Randomly calling on students during the share can decrease equity issues in a whole-group discussion

Challenges:

- Students fear negative evaluation/worry about judgement when sharing¹
 - ◆ Fear causes difficulties thinking through problems²
 - ◆ Due to excess mental energy used on fear?
- This fear may turn into anxiety
 - ◆ Anxiety has additional negative effects³



Footnotes:

1. Watson and Friend, 1969; Cooper et al., 2018; Cooper and Brownell, 2020; Downing et al., 2020
2. Heimberg et al., 2010; Cooper et al., 2018; Downing et al., 2020
3. Buzinski et al., 2020; Seipp, 1991; England et al., 2017, 2019; Buzinski et al., 2020

Assumption 3

The more that students talk in front of the whole class during the share, the more comfortable they will be

Challenges:

- For students to become less anxious, need multiple opportunities¹
 - ◆ In a regular semester, not enough opportunity to make a difference
- Positive experiences help, while negative experiences can deter²
- Most careers don't require speaking out about topics one is not familiar with



Footnotes:

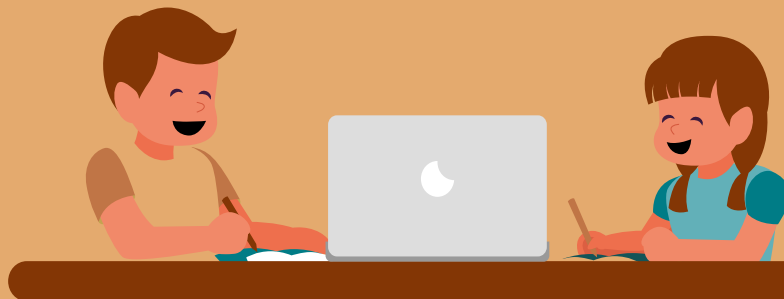
1. Gray and McNaughton, 2000; Dallimore et al., 2013
2. Gray and McNaughton, 2000; Heimberg et al., 2010; Cooper et al., 2018

Assumption 4

The share motivates students to participate in think-pair¹

Challenges:

- This motivation may be out of fear²
 - ◆ Is this what we want to use to motivate students?
- Other ways to motivate students³
 - ◆ Instructor Talk
 - ◆ Decreasing Social Distance



Footnotes:

1. Dallimore et al., 2013; Broeckelman-Post et al., 2016; Knight et al., 2016; Leupen et al., 2020
2. Downing et al., 2020
3. Seidel et al., 2015; Harrison et al., 2019, O'Sullivan et al., 2004; Seidel and Tanner, 2013

Assumption 5

Students benefit from hearing student language during the share, beyond what they have already heard in the pair¹

Challenges:

- Small-group discussion might already be enough
- Student explanations might use incorrect intuition²
- Students judge knowledge/expertise based on identity³
 - ◆ May judge correctness based on stereotype
 - ◆ Sharing can make these judgements worse⁴



Footnotes:

1. Schunk et al., 1987; Monaghan and Stenning, 1998; Smith et al., 2009; Chi et al., 2017
2. Coley et al., 2017
3. Grunspan et al., 2016
4. Aguillon et al., 2020; Eddy et al., 2014

Assumption 6

The share is particularly a problem in big classes, because small-class discussions involve everyone and likely do not cause student anxiety

Challenges:

- Argues that small class sizes do still have inequities
 - ◆ Equitable strategies do help across all class sizes for women¹
 - ◆ Some students still have anxiety from random calls²
- Illusion of fairness causes additional issues



Footnotes:

1. Ballen et al., 2019
2. Downing et al., 2020

Proposed Solutions



Modifying Share



Real-Time
Synthesis



Asynchronous
Synthesis



Eliminating Share



Modifying the Share

Optional Consent

Ask students for permission prior to them sharing

Learner agency

More equitable

Reassurance

Time to prepare



Local Sharing

Sharing within medium sized groups

Less pressure

Everyone participates

More ideas heard



Go-Around

Every student/group shares

Everyone participates

Reduces fear (open-ended)

Requires specific scenarios



Real Time Synthesis

Polling

Do a survey during the think period

Everyone participates

Systematic

Easy to do online

Anonymous



Listening-in

Instructor walks around and listens during pairing

More equitable

Address themes

Instructor responsiveness



Assigning Competence

Recognizing specific contribution of student

Help low status individuals¹

Change class perception



Footnotes:

1. Cohen et al., 1999

Asynchronous Synthesis:

Index Cards

Have students write ideas on cards

Everyone participates

Address themes

More time



Electronic Posts

Having students post online after class

Everyone participates

Increased student comfort¹

More Time



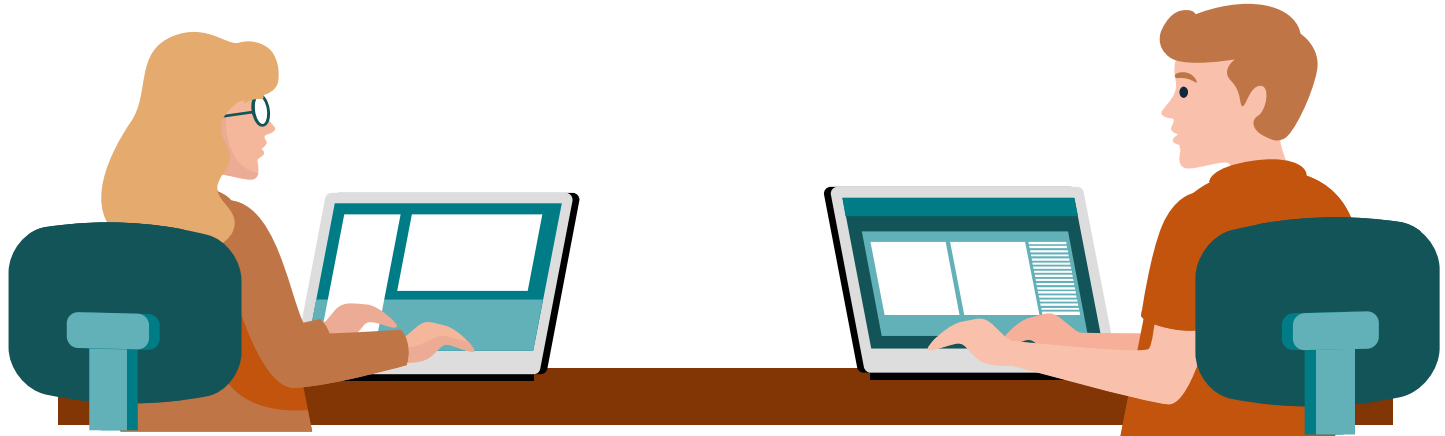
Footnotes:

1. Hsi and Hoadley, 1997

Eliminating Share?

- Minimal lecturing can still be preserved with active learning¹
 - ◆ Or more time for other activities
 - Instructor does not determine who gets to share
-

Which method should one use?



Footnotes:

1. Owens et al., 2017

Conclusion

TABLE 2. Common assumptions about the share piece of the think–pair–share and challenges to those assumptions

Assumptions about the share	Challenges to the assumption
Assumption 1: The share is an effective way for me to figure out what students are thinking so I can adjust to their needs.	Challenge: The ideas that emerge during a share may not reflect the richness or the diversity of student ideas exchanged in pair discussions.
Assumption 2: Randomly calling on students during the share decreases equity issues in whole-group discussion.	Challenge: Random call may perpetuate new inequities by causing student anxiety in both large- and small-enrollment courses.
Assumption 3: The more students talk in front of the whole class during the share, the more comfortable they will be.	Challenge: The amount of practice needed by each student to increase skill and comfort in sharing in front of the whole class may not occur in most contexts.
Assumption 4: The share motivates students to participate in the think and pair.	Challenge: There may be alternative or even better ways to internally motivate students to participate than the external motivation to avoid getting a question wrong in front of peers.
Assumption 5: Students benefit from hearing student language during the share, beyond what they have already heard in the pair.	Challenge: Students may embrace particular ideas offered in the share because of the status of the student sharing it.
Assumption 6: The share is particularly a problem in big classes, because small-class discussions involve everyone and likely do not cause student anxiety.	Challenge: A subset of students may still dominate discussions, and some students report experiencing anxiety in small classes.

Modifying Share



Real-Time
Synthesis



Asynchronous
Synthesis



Eliminating Share



Author's Final Thoughts

- No right/wrong way to teach
 - ◆ Important to consider the nature and necessity of share
- Future research:
 - ◆ How is sharing affected by class size?
 - ◆ How effective are the alternatives to share?
 - ◆ How effective is changing teaching based on share?
 - ◆ Involvement of other instructor variables



Post Script

Group sharing is just how we do science. That's just the culture of science...

Challenges:

- Those with highest comfort level/professional status speak and ask questions¹
- Is this culture beneficial? Should we be asking students to adapt if it is not?



Footnotes:

1. Grunspan et al., 2016; Carter et al., 2018

Personal Comments

- Important to keep in mind author biases when reading this paper
 - Some of the citations were not as robust
- Logic was relatively clean
 - Some issues with Assumption 3 (share improves comfort) challenge
 - Are university classes where we should be improving this skill?
- Future study on benefits of full class interaction in general



Thank you for watching!

Icons & design were obtained from slidesgo.com

Now onto the discussion...

