



FROM MINOR CHANGES TO MAJOR LEARNING

James M. Lang
@LangOnCourse

The Power of Small Changes

“Much of what we’ve been doing as teachers and students isn’t serving us well, but some comparatively simple changes could make a big difference.”

Brown, Roediger, McDaniel
Make it Stick (Harvard UP, 2014)





Small Teaching Innovations

- Brief (5-15 minute) interventions into individual learning sessions
 - Limited number of interventions or activities within an entire course
 - Minor changes to course design, assessment structure, or communication with students
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Small Teaching



Knowledge



Understanding



Community



RETRIEVAL

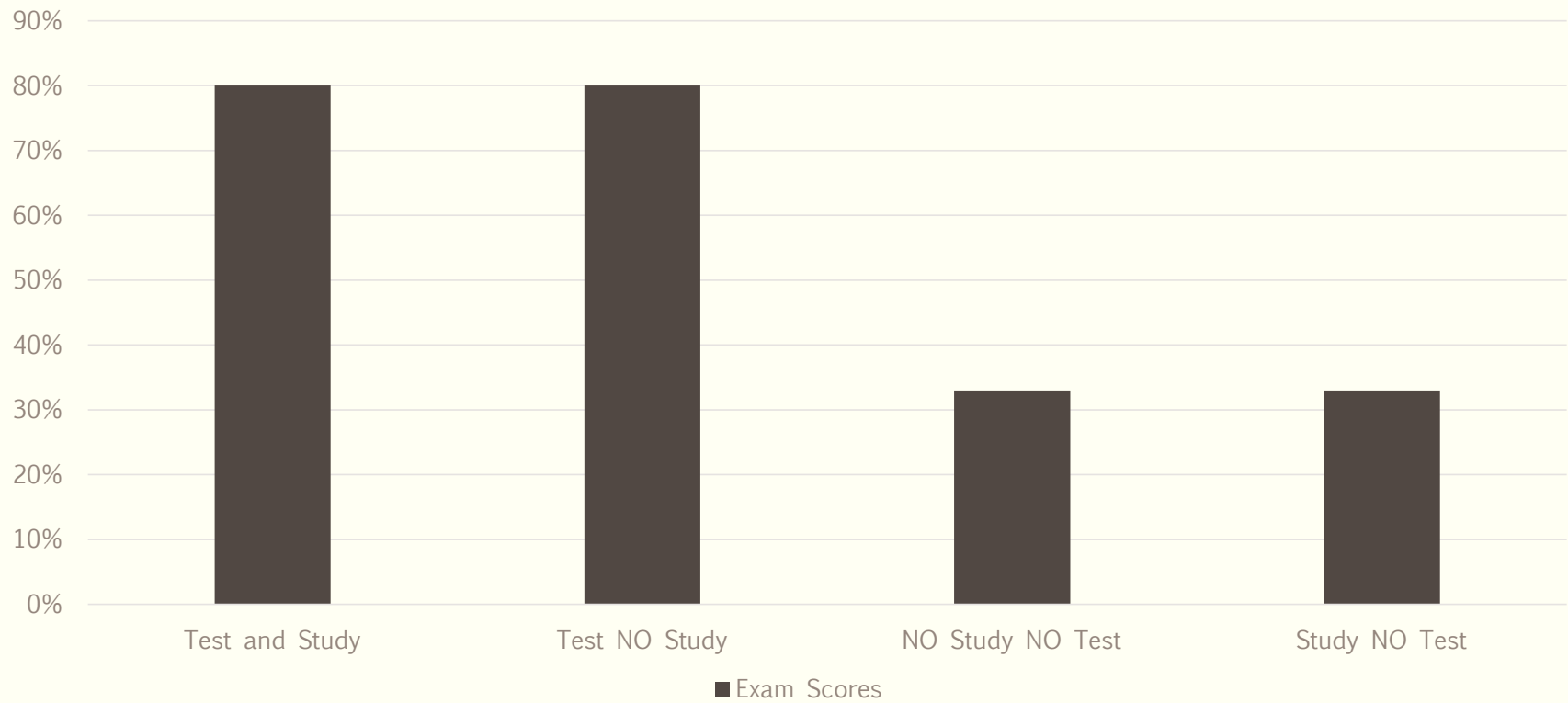
Building the Foundation

Knowledge: “The Hidden Power” of Cognition

- “Learning skills grow organically out of specific knowledge domains—that is to say, facts . . . The wider your knowledge, the more widely your intelligence can range and the more purchase it gets on new information.”

Ian Leslie, *Curious*

Retrieval Practice in the Laboratory



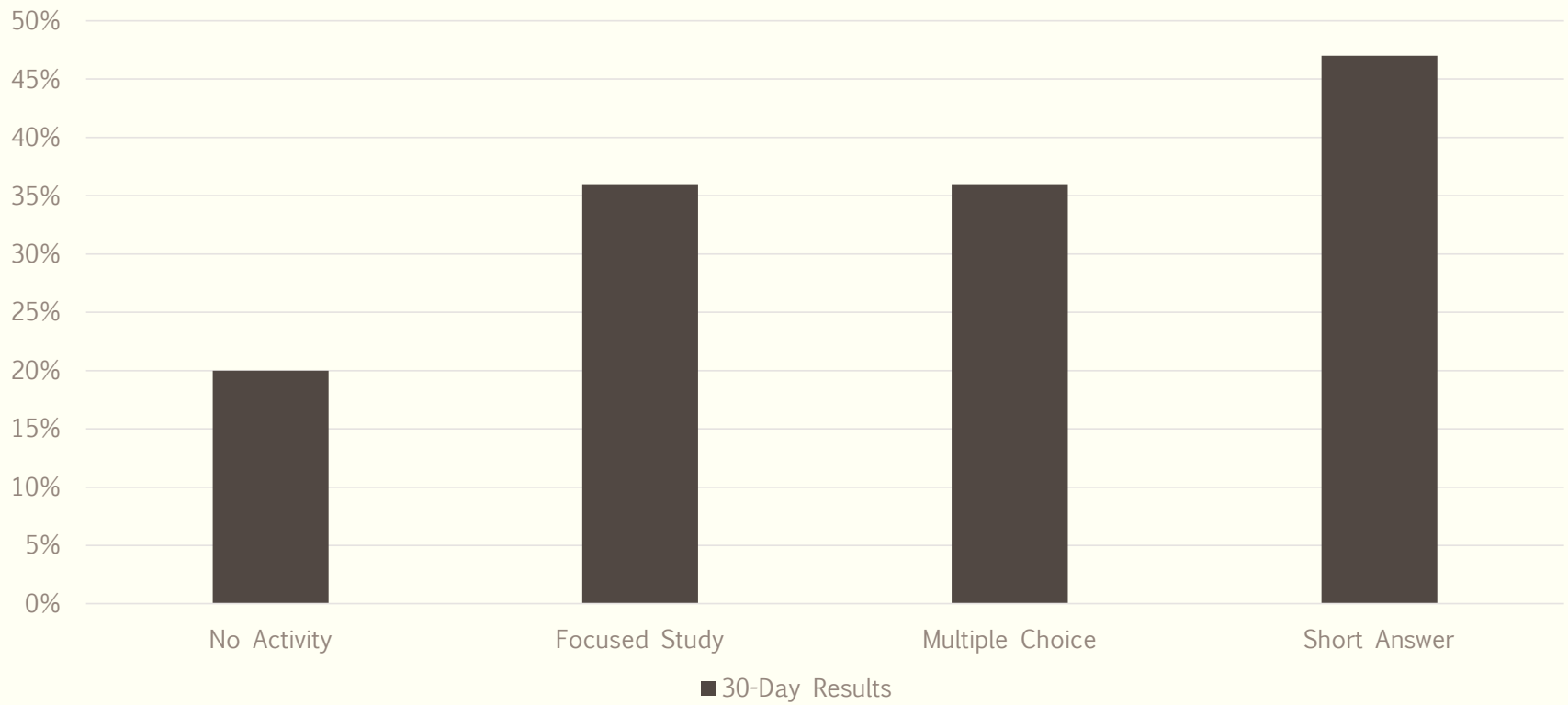


Limits of Long-Term Memory

“In long-term-memory the limiting factor is not storage capacity, but rather the ability to find what you need when you need it. Long-term memory is rather like having a vast amount of closet space—it is easy to store many items, but it is difficult to retrieve the needed item in a timely fashion.”

Michelle Miller

Thinking to Retrieve



Retrieval as a Form of Thinking


- “By retrieving a memory we modify, reorganize, and consolidate it better in our long-term storage. Furthermore, recalling a memory often creates additional retrieval pathways to that memory, and makes it easier to find it later. Lastly, by searching for a memory, we frequently activate information connected to that memory and link it in a more networked context for easier future access.”

Tricia Taylor

The Learning Scientists



Small Teaching: Retrieval

- 
- Open class by asking students to *“remind” you of previous content or summarize readings.*
 - Close class by . . . asking students to *write down the most important concept from that day* (i.e., the minute paper) and *one remaining question.*
 - *Use clickers or low-tech polling activities* to test student mastery of core concepts at occasional intervals throughout the class period.

Which learning strategy did the researchers find most effective for students?

Summarizing

Elaborative
Interrogation

Practice Testing

Self-Explaining

Keyword
Mnemonics

Summary of Learning Strategies (2013)

Low Utility

- Summarization
- Highlighting
- Re-reading
- Keyword Mnemonics
- Imagery

Moderate to High Utility

- Elaborative Interrogation
- Interleaved Practice
- Self-Explanation
- Distributed Practice
- Practice Testing




CONNECTING

Expansion and Transfer



Teaching for Transfer



“Transfer does not happen easily or automatically. Thus, it is particularly important that we ‘teach for transfer’—that is, that we employ instructional strategies that . . . help students make appropriate connections between the knowledge and skills they possess and new contexts in which those skills apply.”

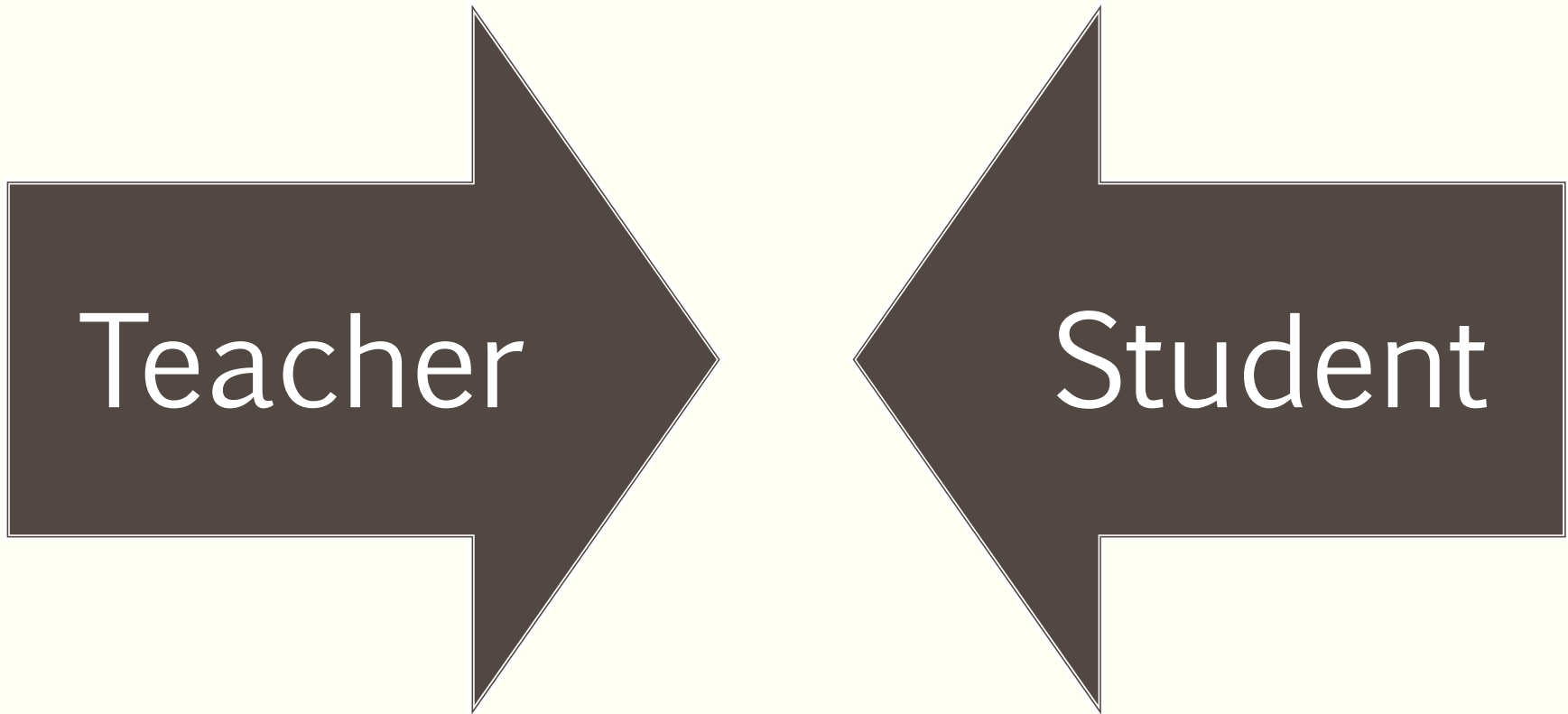
How Learning Works

The Meaningful Writing [Assessment] Project

- “Opportunities for agency”;
- “Engagement with instructors, peers, and materials”;
- “Learning that connects to previous experiences and passions and to future aspirations and identities.”

(2016)

Helping Students Make Their *Own* Connections



Connection Prompts

- Describe one way in which the day's course content manifests itself on campus or in their home lives.
- Identify a television show, film, or book that somehow illustrates a course concept from class.
- Explain how today's material connects to last week's.
- Articulate how that day's material connects to something they learned in another course.
- How would you connect today's material to any current political/economic/social debate we are having?

Water



3. The project: delivering your passion, interests and knowledge to your target audience



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1. Identify something
you're passionate about
or want to learn more
about

2. Identify a group of
people who you think
should care/know
about your topic



ELSI of Genetics

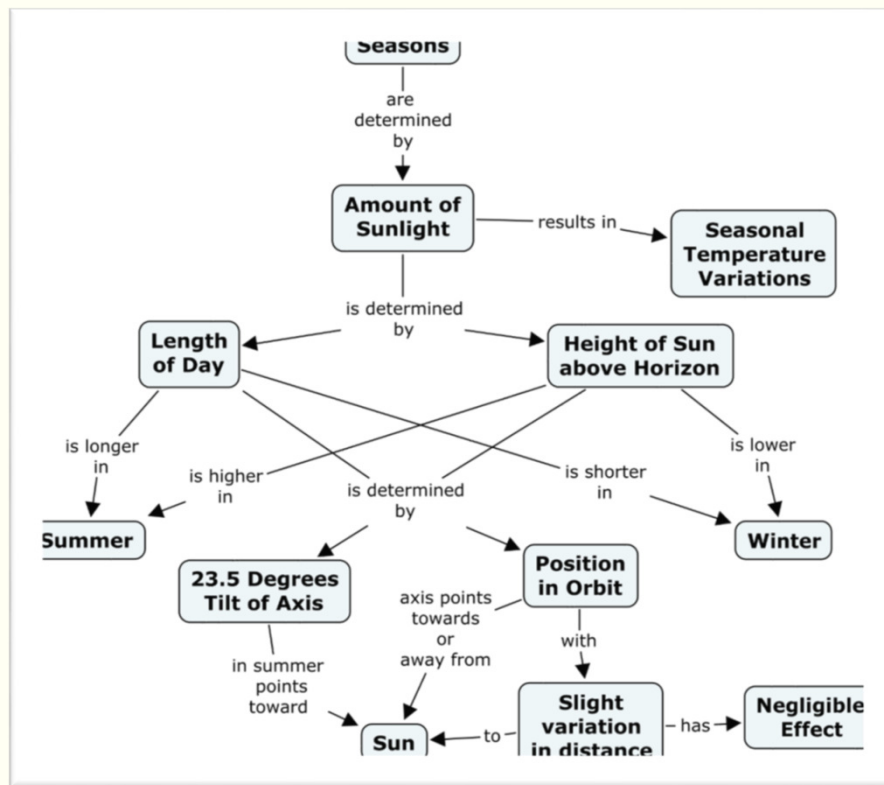


Food insecurity

Prof. David Crowley
Assumption College



Concept Maps



- A meta-analysis of 55 studies found that students who completed concept maps on a topic had higher levels of knowledge retention and transfer compared to students who read passages of text, attended lectures, or participated in classroom discussions on the topic (Nesbit & Adesope 2006).”

ABL Connect


Well-Wrought Learning

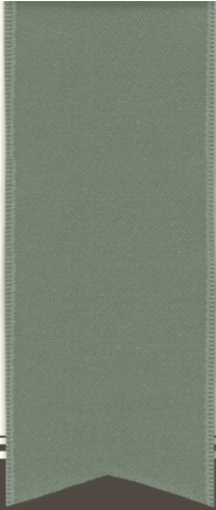
- “You now see why ‘cramming’ must be so poor a mode of study. Cramming seeks to stamp things in by intense application immediately before the ordeal. But a thing thus learned can form but few associations. On the other hand, the same thing recurring on different days, in different contexts, read, recited on, referred to again and again, related to other things and reviewed, gets well wrought into the mental structure.”

William James (1899)



Small Teaching: Connections

- *Consider using connection notebooks or discussions* to help students connect course material to their lives.
 - Allow students to *connect one assessment to an audience of their choosing*.
 - Require students to *create concept maps multiple times or with different organizational principles*.
- 




THE COMMUNITY



Values Affirmations

- In the context of higher education, values affirmation activities have been shown to improve the performance of female learners in a physics course (Miyake et al., 2010), underrepresented minority learners in a biology course (Jordt et al., 2017), and first-generation college learners (Harackiewicz et al., 2014), among others. In most studies, this activity was found to have a significant, positive impact on learners' performance even when incorporated into a course only once or twice during a semester.

Northeastern CATLR



Value and Affirmation Questions

- What are your most important values? How do you express them?
- What are your academic strengths?
- What skills, knowledge, attitudes or habits do you bring to our learning community?

Collaborative and Concrete: The Worksheet

“Strikingly, worksheets had a strong effect on increasing student performance, despite the variability in worksheet styles and practices implemented across courses . . . Worksheets do not necessarily require large time investments by the instructor for development or feedback; their construction can be relatively straightforward such as using questions based on previous tests or problem sets and they need not be handed in for grading.”

PLOS One (August 2019)

Name: _____ Date: _____

EXPERIMENTAL DESIGN WORKSHEET

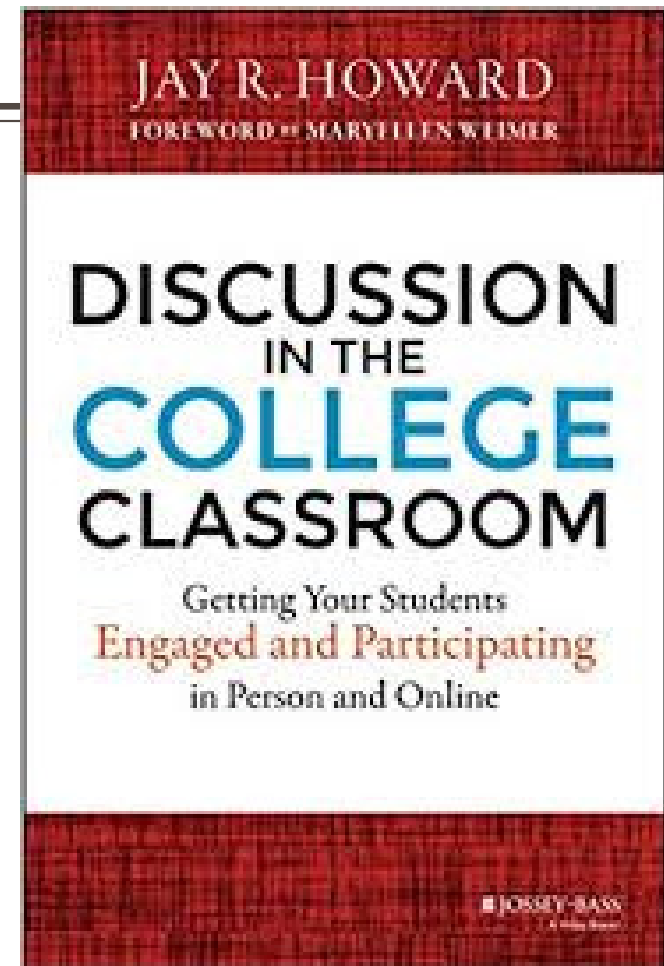
***Topic**
What subject or topic will you explore with this experiment? Examples: preventing apples from turning brown, highway noise pollution, free throw accuracy (basketball), music and memory, fertilizers and plant growth.
My topic is: _____

***Problem/Question and Purpose**

- The **problem** describes the issue that has motivated you to explore this topic. For example, one possible problem could be: *the Proudest Pea Plant Competition at the State Fair requires that pea plants be at least 25 cm tall in order to enter, but my plants are usually only 10-15 cm tall.*
My problem is: _____
- The **question** asks about the relationship between two variables in a way that can be answered by doing an experiment. For example: *how does the amount of fertilizer affect the height of pea plants?*
Try using this template:
How does _____ [affect, change, increase, etc.] _____?
My question is: _____
- The **purpose** clearly states why you are doing the experiment. For example: *the purpose of this experiment is to find out how much fertilizer I need to help my pea plants grow to at least 25 cm.*
My purpose is: _____

Every Child A Scientist Workshop, July 21-23, 2004, Emory College Center for Science Education
<http://www.science.emory.edu/psccollege> Page 1 of 4
Last Updated: 7/21/04

Establishing Participation Norms



Waiting for Your Students

I can think of many cases in which I have been labeled as that student who listens, but does not participate, specifically in many of my math courses. This is not due to of a lack of desire to participate; rather, it is because I cannot solve problems as quickly as others and raise my hand confidently in time to grasp that one extra participation point.

Kelliann Keaney



Small Teaching: Community

- Provide an opportunity for students to *affirm their values or academic strengths* early in the semester, and acknowledge those strengths however and whenever you can.
- Use *concrete, collaborative activities to get all students participating in class*, and use those activities to help students get to know one another and feel more comfortable in the room.
- Establish *participation norms that give time and place for quieter students to participate* in classroom activities and discussions.

More Information and Resources . . .

- “Small Changes in Teaching”
- RetrievalPractice.org
- *How Learning Works*
- *Discussion in the College Classroom*

