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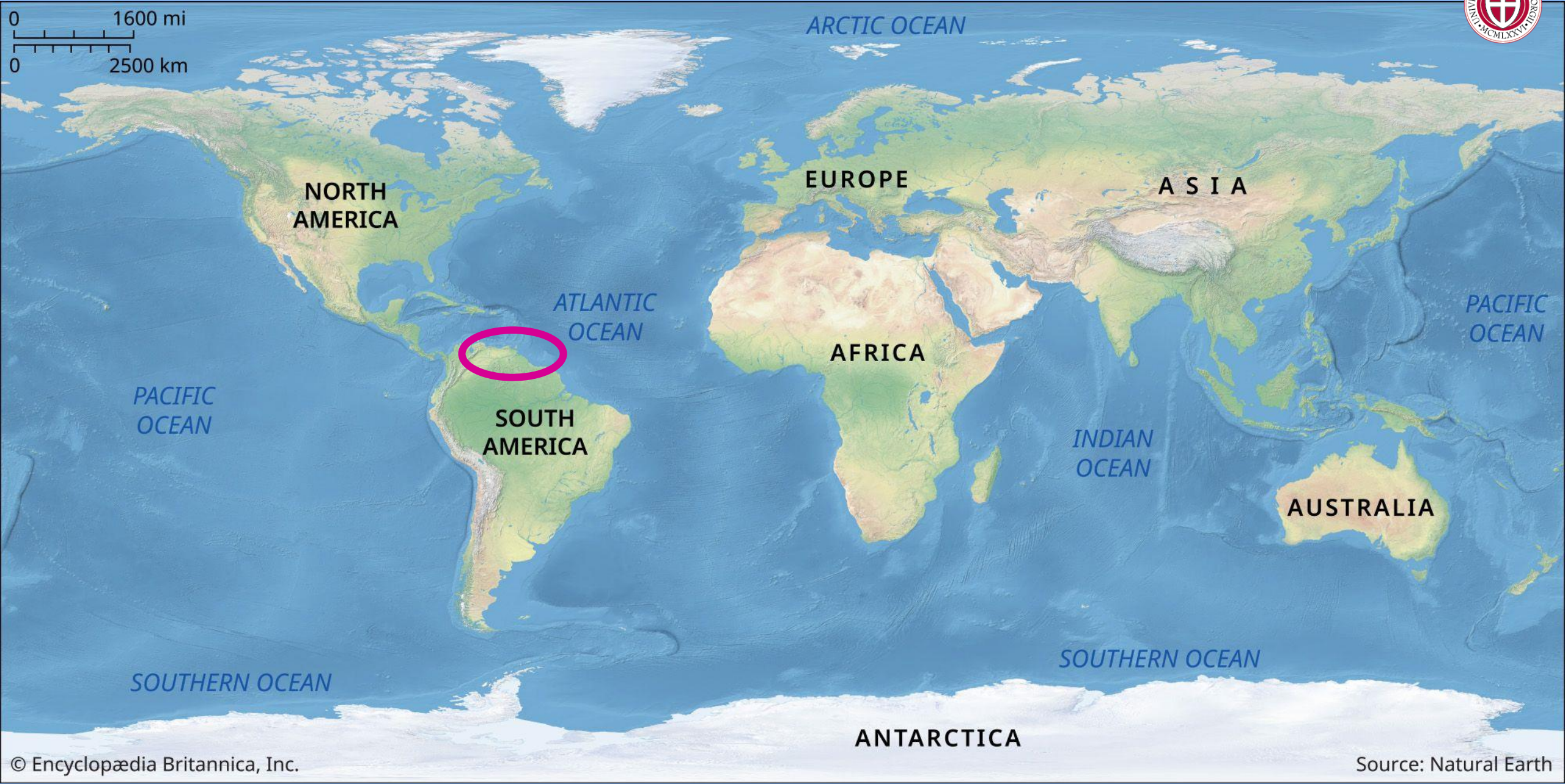
**Prakash V.A.K. Ramdass, MD, MPH**

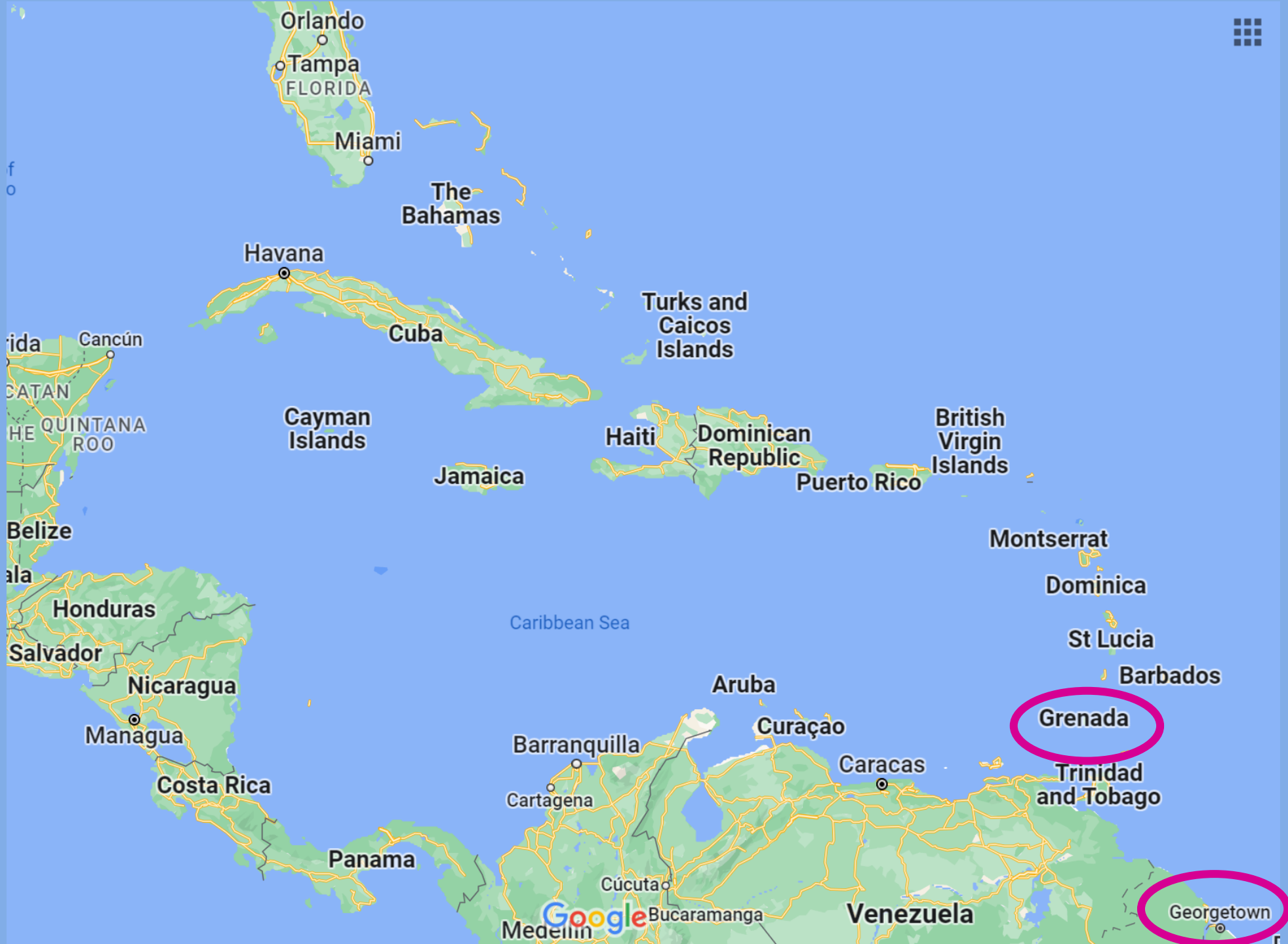
**Professor**

**St. George's University School of Medicine**

**St. George, Grenada**

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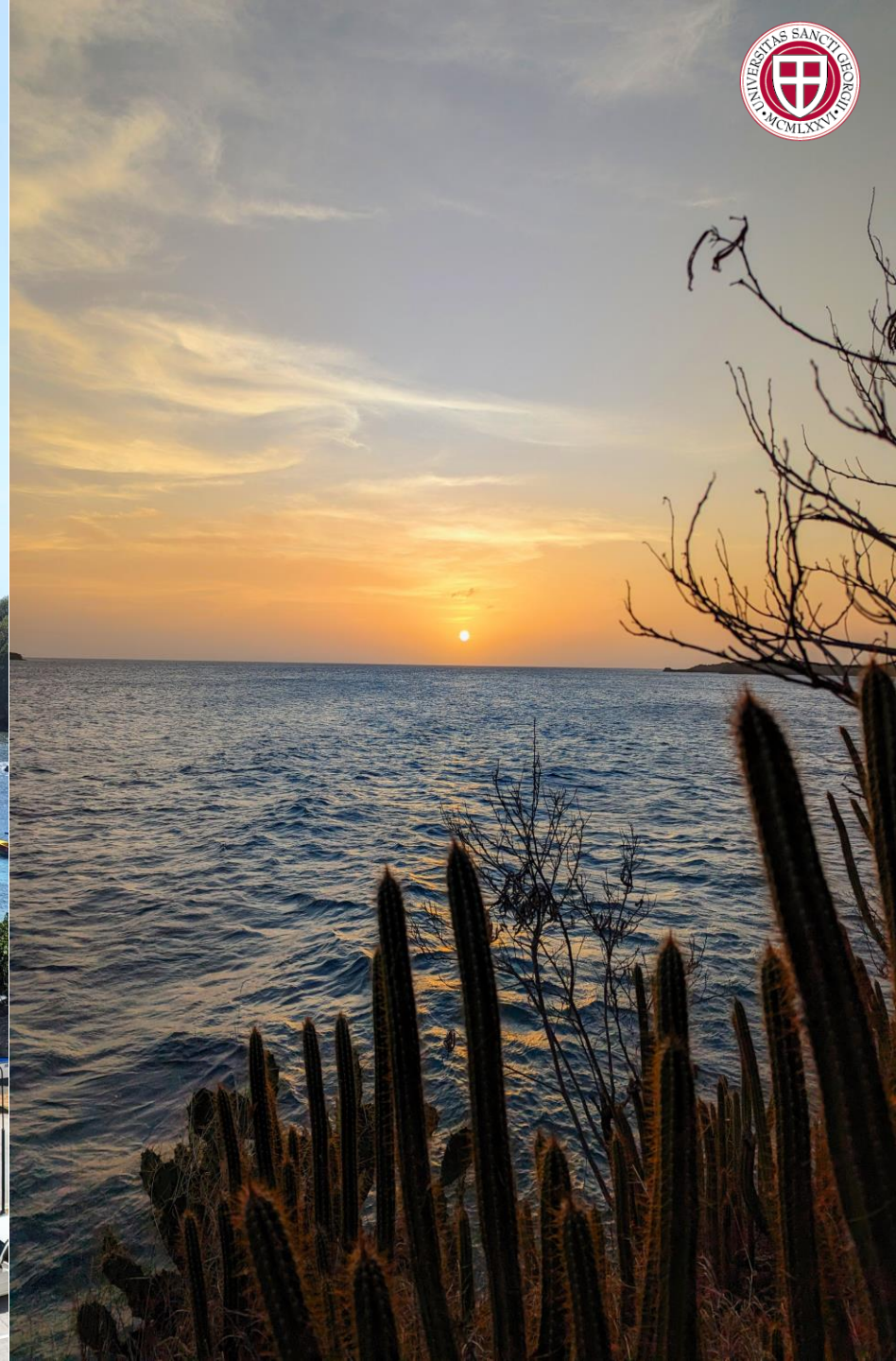


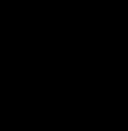


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# Effectiveness of Self-Directed Learning In Undergraduate Medical Education: a Systematic Review and Meta-Analysis



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# Presentation Outline



Introduction



Study Selection  
& Data  
Extraction



Data Synthesis  
& Analysis



Results



Discussion  
&  
Conclusions

# AIM

To estimate the overall effectiveness  
of self-directed learning (SDL)  
compared to  
traditional didactic learning (TDL).

# Relevance

## *SDL*

Developed in 1997 by D.R. Garrison

Builds on Malcom Knowles theory of andragogy

Emphasizes adult learners to take their own initiative

Identify what is needed to learn

Tailored to their own learning process

## *TDL*

Classroom lecture

Teacher imparts information or knowledge through a structured presentation

Teacher typically serves as the primary source of information

Students listen, take notes, and absorb the content being presented

Efficient knowledge transmission, clear structure, utilization of teacher expertise



# Methods: Registration and Database Search

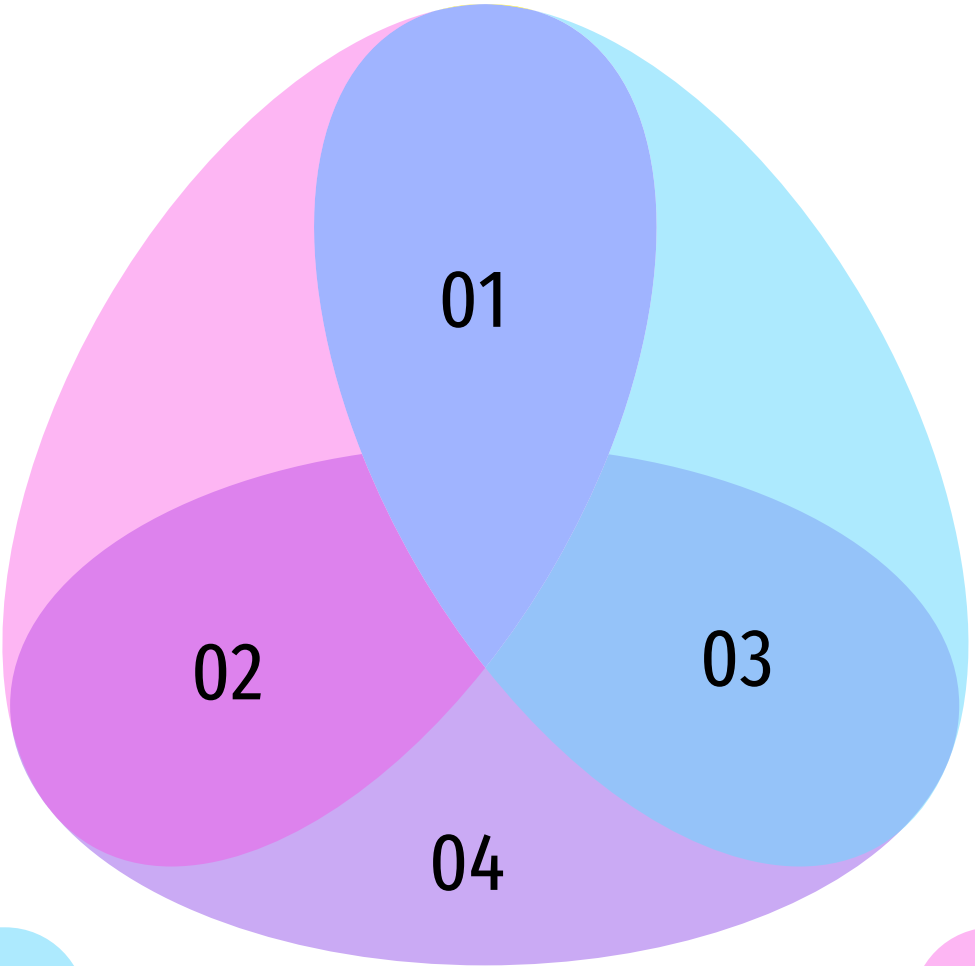


MEDLINE

EMBASE

SCOPUS

GOOGLE SCHOLAR



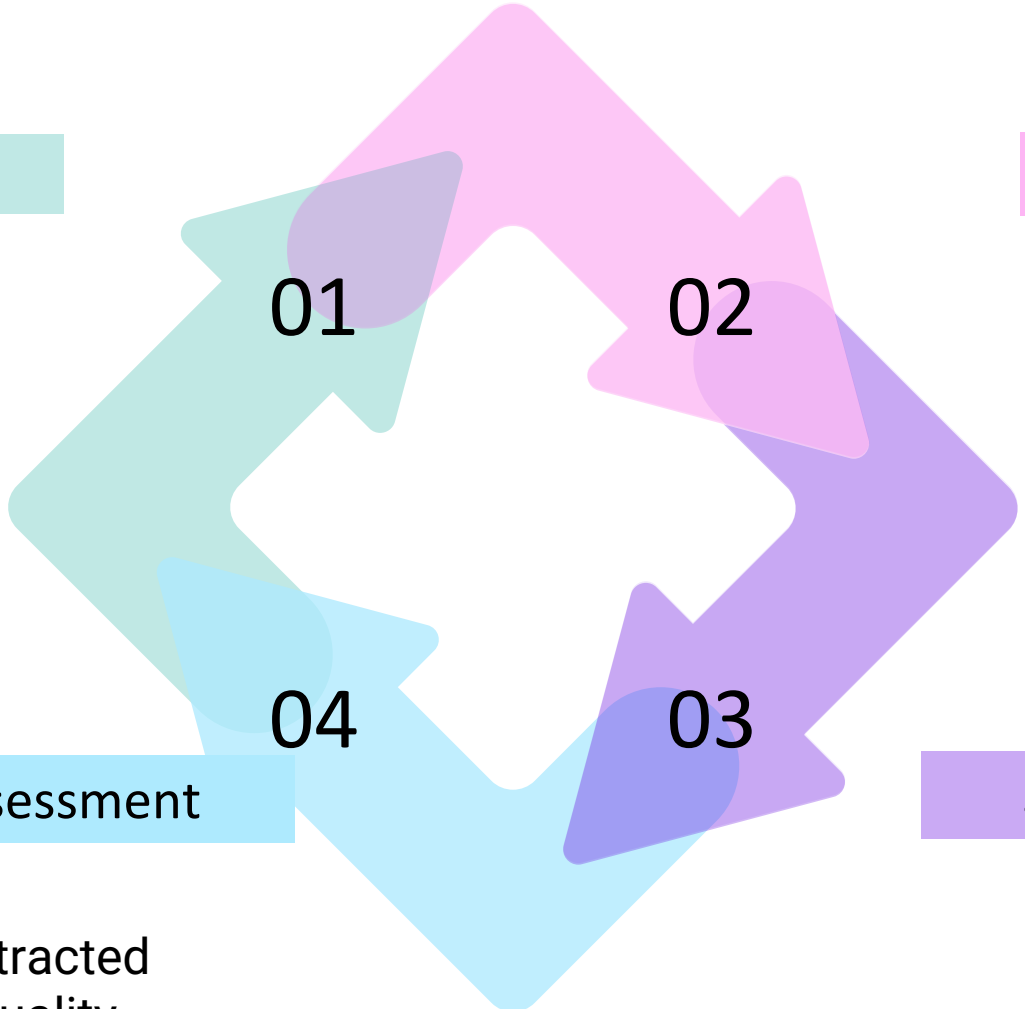
**PRISMA and PRISMA-P Protocol**

**Prospero Registration**

# Methods: Study Selection & Data Extraction

Zotero Reference Manager

Duplicates were removed



First Screen: Abstracts

J.A and P.R independently screened for **eligibility** and **relevance**

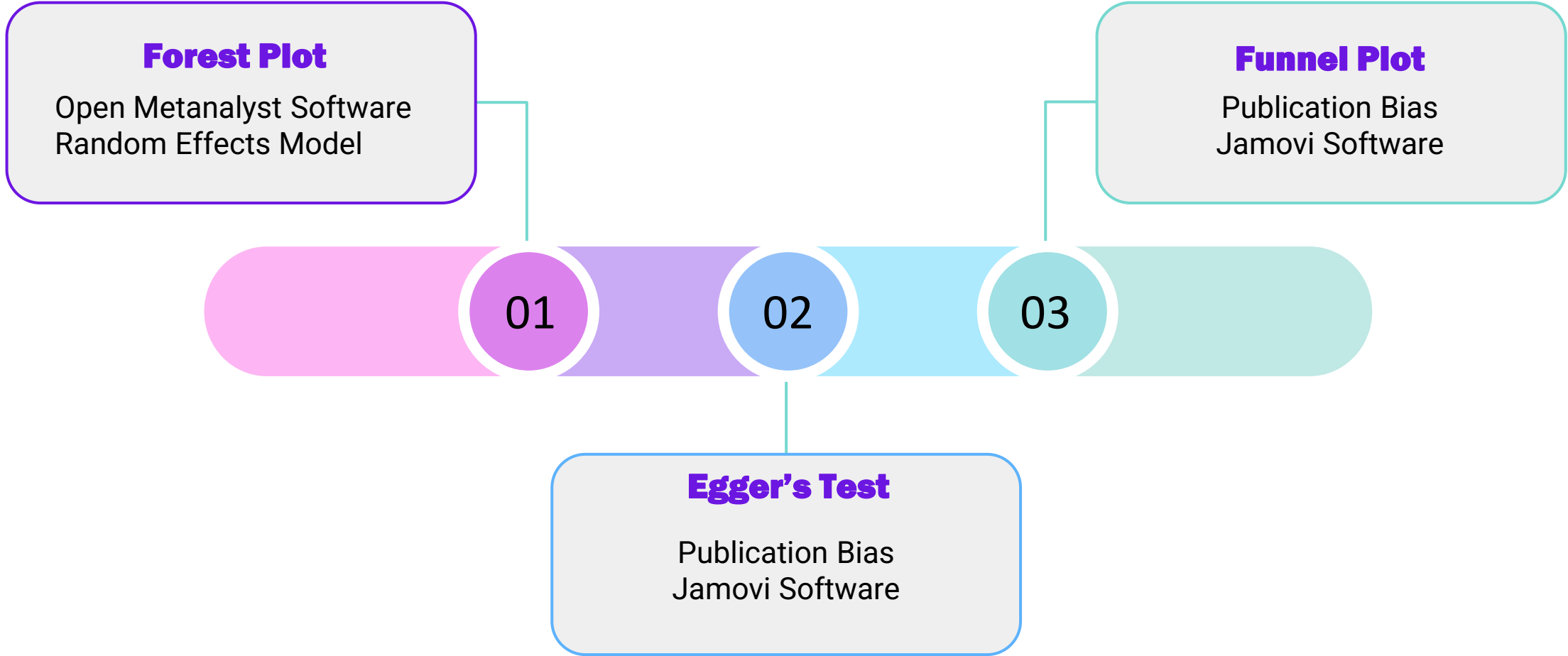
Second Screen: Full Text

Original **case-control, cross-sectional, RCT, and cohort studies** with SDL medical undergraduate

Data Extraction & Quality Assessment

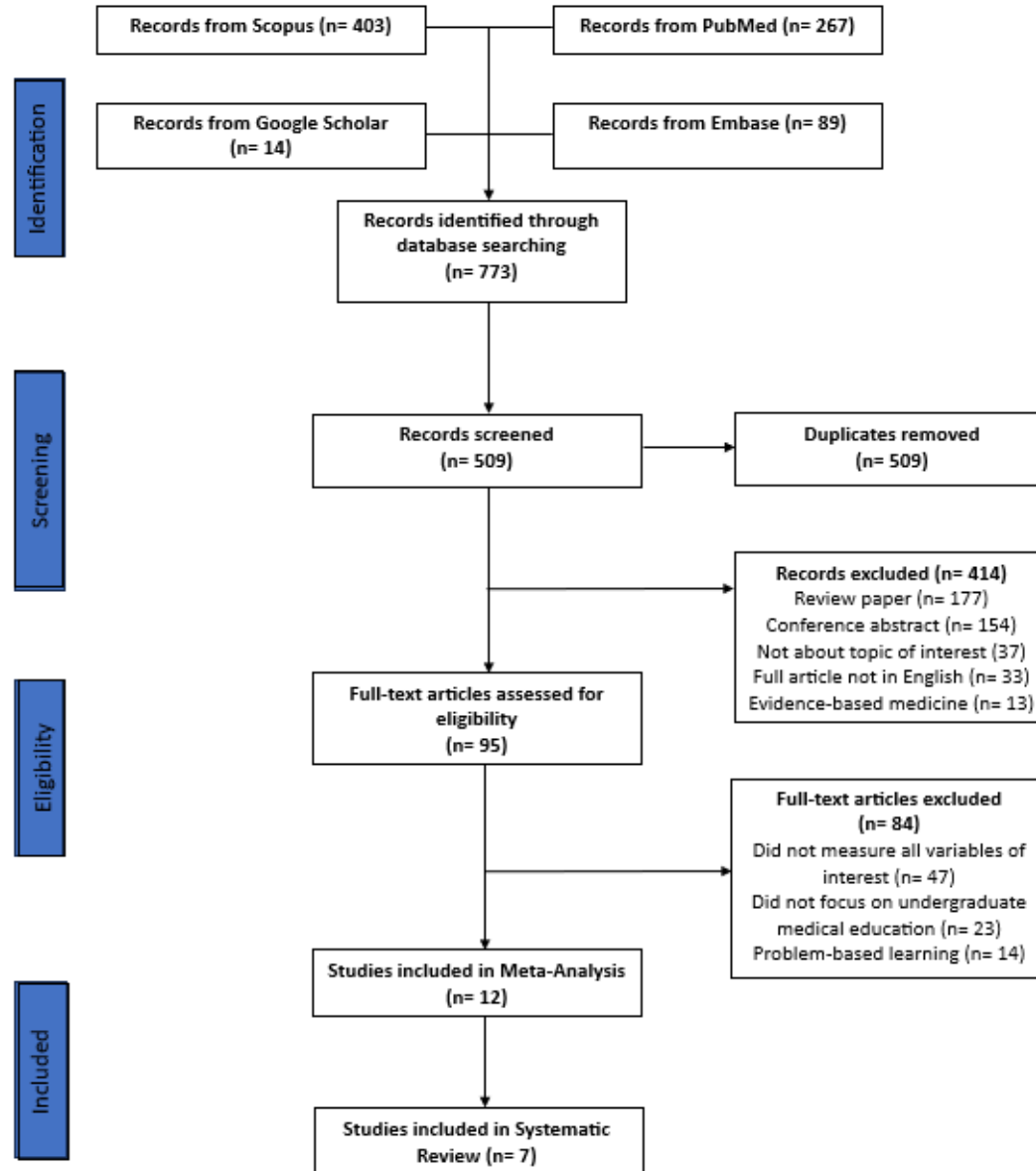
J.A. and P.R independently extracted data. **CASP** used to assess quality.

# Methods: Data Synthesis and Analysis





# Results: Flow Chart of Included Studies





# Characteristics of Included Studies

Study	Study Site	Study Design	Sample Size	Number of students using SDL
<b>META-ANALYSIS</b>				
<b>Bradley, 2005 (11)</b>	Norway	RCT	175	85/175
<b>Mahler, 2011 (12)</b>	Louisiana, USA	RCT	233	62/233
<b>Rong, 2011 (13)</b>	China	Controlled Trial	205	102/205
<b>Mahmud, 2013 (14)</b>	Rawalpindi, Pakistan	Cross-sectional	194	58/194
<b>Gawad, 2014 (5)</b>	Toronto, Canada	RCT	24	12//24
<b>Daly, 2016 (6)</b>	Illinois, USA	RCT	33	16/33
<b>Peine, 2016 (15)</b>	Germany	RCT	223	115/223
<b>Lian, 2017 (7)</b>	Perth, Australia	RCT	30	10//30
<b>Nathaniel, 2018 (4)</b>	South Carolina, USA	RCT	105	53/105
<b>SYSTEMATIC REVIEW</b>				
<b>Done, 2001 (16)</b>	Liverpool, Australia	Controlled Trial	27	-
<b>Tolsgaard, 2013 (17)</b>	Copenhagen, Denmark	Qualitative	498	-
<b>Jons-Cox, 2014 (18)</b>	Colorado, USA	Controlled Trial	165	-
<b>Cawthorn, 2014 (19)</b>	Manitoba, Canada	RCT	57	-
<b>McGrath, 2015 (20)</b>	Ireland	Cross-sectional	437	-
<b>Hill, 2020 (21)</b>	Oklahoma, USA	Qualitative	131	-
<b>Si, 2022 (22)</b>	Busan, South Korea	Cross-sectional	140	-

# Description of SDL Types

Study	SDL Type	Findings
<b>Bradley, 2005 [11]</b>	(Theoretical) Computer Assisted Self-Directed Learning	Study suggests that computer-assisted SDL may be an alternative format for teaching EBM.
<b>Mahler, 2010 [12]</b>	(Theoretical) SDL ECG Manual	Three types of teaching techniques compared: SDL format, lecture-based format and workshop format in learning ECG Interpretation. Self-Directed learners showed lower test scores.
<b>Rong, 2011 [13]</b>	(Theoretical) Combined Didactic Teaching and Self-Directed Learning (DT/SDL), Assigned Display Board Presentation	Combined didactic and SDL learning compared to didactic teaching (DT) in improving students' knowledge of depression. Combined DT/SDL group showed greater improvement in recognition of depression.
<b>Mahmud, 2013 [14]</b>	(Theoretical) SDL in Research	Study designed to describe the correlation between SDL and medical students' attitude towards research. Students who participated in extra-curricular research projects had relatively higher scores on OCLI in comparison to those who did not.
<b>Gawad, 2014 [5]</b>	(Practical) SDL with Laparoscopic Skills	Supervised learning and practice compared to self-directed approach in Stimulation based training curriculum (STC) with laparoscopic skills. Supervised training group outperformed SDL group in peg transfer task.
<b>Daly, 2016 [6]</b>	(Theoretical) Automated Presentation with Audio	In-classroom training compared to SDL training in predicting Barret's Esophagus through NBI Imaging. No significant difference identified.
<b>Peine, 2016 [15]</b>	(Theoretical) Self-instructed learning	Self-directed learning format compared to Instructed learning format. The SDL group reached higher scores compared to non-self-instructed group.
<b>Lian, 2017 [7]</b>	(Practical) Ultrasound Guided insertion of PIVC	Three types of approaches compared: no education, self-guided internet-based education and normal face-to-face traditional education in Ultrasound guided insertion of peripheral IV vascular cannulae (PIVC). The traditional face-to-face teaching group performed significantly better than the other groups.
<b>Nathaniel, 2018 [4]</b>	(Theoretical) Self Directed clinical case learning	Study assess outcome on SDL teaching compared to no SDL teaching in Neuroscience. Significant improvement in test scores was identified in the SDL group.

**SDL = Self-Directed learning, DT = Didactic Teaching, NBI = Narrow Band Imaging, DT/SDL = Didactic Teaching and Self-Directed Learning,**  
**OCLI = Oddi Continuing Learning Inventory, EBM = Evidence Based Medicine, STC = Stimulation based Training Curriculum, PIVC = Peripheral IV Vascular Cannulae (PIVC)**



# Results: Quality Assessment

Study	CASP Score
<b>META-ANALYSIS</b>	
Bradley, 2005 (11)	10
Mahler, 2011 (12)	12
Rong, 2011 (13)	14
Mahmud, 2013 (14)	12
Gawad, 2014 (5)	14
Daly, 2016 (6)	11
Peine, 2016 (15)	12
Lian, 2017 (7)	14
Nathaniel, 2018 (4)	8
<b>SYSTEMATIC REVIEW</b>	
Done, 2001 (16)	8
Tolsgaard, 2013 (17)	8
Jons-Cox, 2014 (18)	7
Cawthorn, 2014 (19)	7
McGrath, 2015 (20)	10
Hill, 2020 (21)	8
Si, 2022 (22)	12

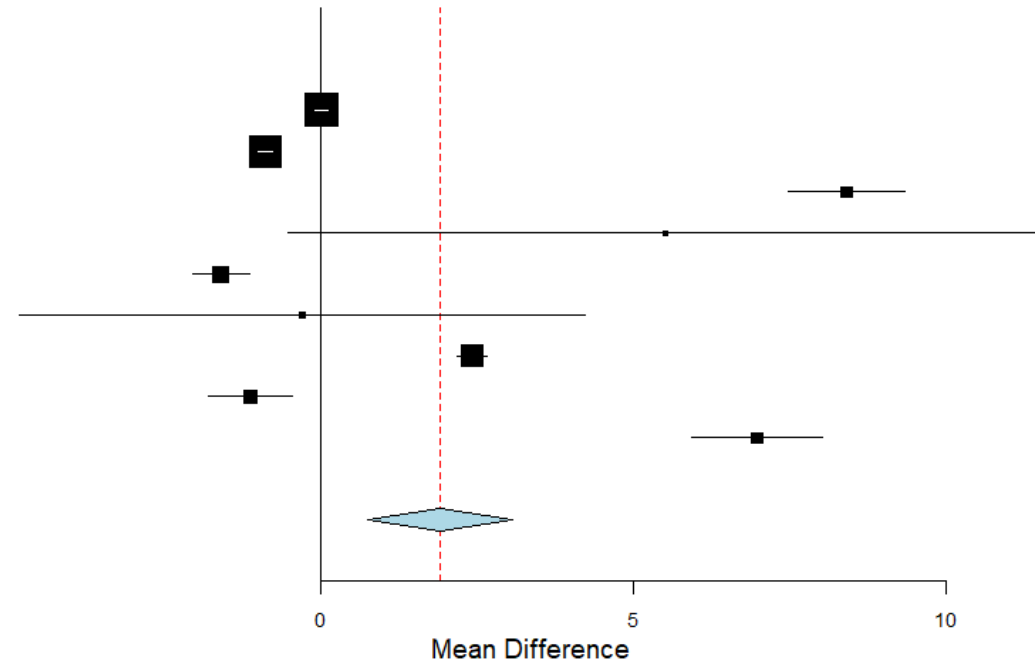
# Forest Plot: Overall SDL

Mean Difference: 1.91, 95% CI [0.75 – 3.06],  $p < 0.01$

**Studies**

Mean Difference (95% CI)

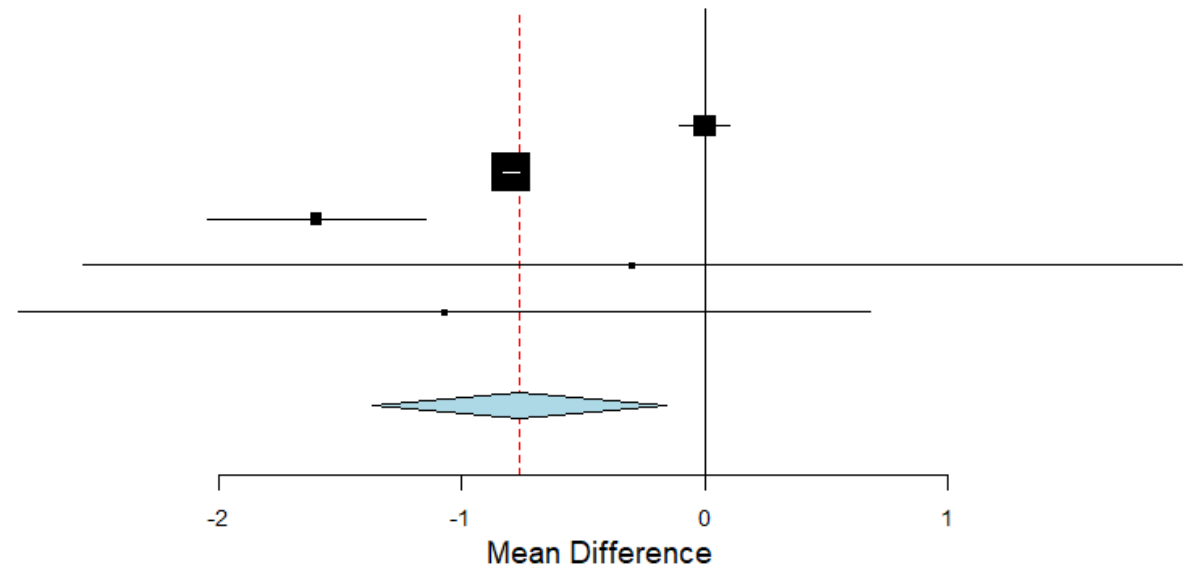
Bradley 2005	0.00	(-0.10,	0.10)
Mahler 2010	-0.90	(-1.01,	-0.79)
Rong 2011	8.40	(7.47,	9.33)
Mahmud 2013	5.50	(-0.53,	11.53)
Gawad 2014	-1.60	(-2.05,	-1.15)
Daly 2015	-0.30	(-4.83,	4.23)
Peine 2016	2.41	(2.17,	2.65)
Lian 2017	-1.13	(-1.80,	-0.46)
Nathaniel 2017	6.97	(5.92,	8.02)
<b>Overall (<math>I^2=99.32\%</math> , <math>P &lt; 0.01</math>)</b>	<b>1.91</b>	<b>(0.75,</b>	<b>3.06)</b>



# Forest Plot: Individual SDL

Mean Difference: -0.76, 95% CI [-1.37 – -0.16],  $p < 0.001$

Studies	Mean Difference (95% CI)
Bradley 2005	0.000 (-0.104, 0.104)
Mahler 2010	-0.800 (-0.833, -0.767)
Gawad 2014	-1.600 (-2.048, -1.152)
Daly 2015	-0.300 (-2.563, 1.963)
Lian 2017	-1.075 (-2.828, 0.678)
<b>Overall (<math>I^2=98.18\%</math>, <math>P &lt; 0.001</math>)</b>	<b>-0.763 (-1.368, -0.157)</b>

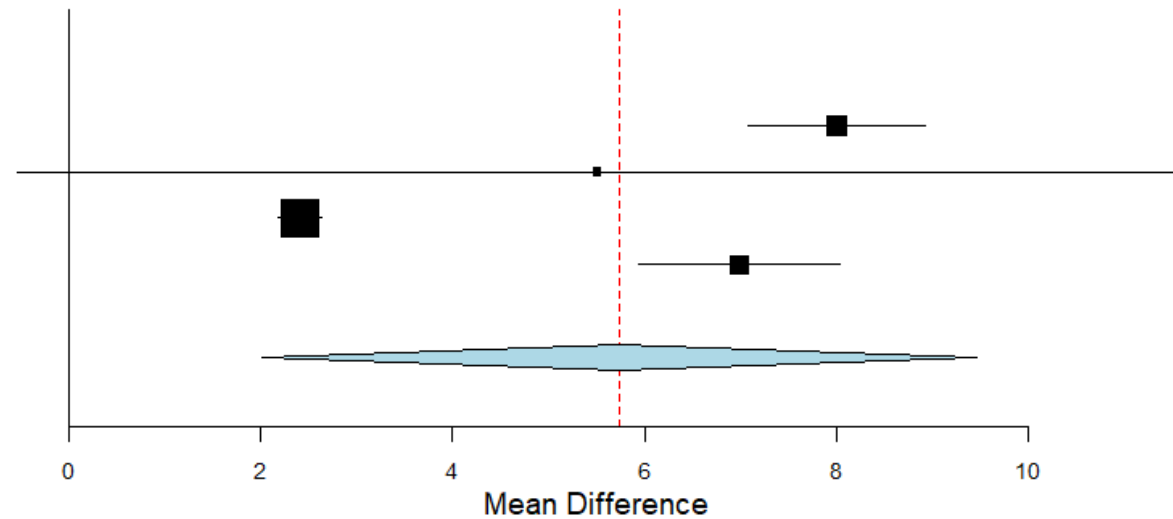


## Forest Plot: Grouped SDL

Mean Difference: 5.73, 95% CI [2.01 – 9.45],  $p < 0.001$

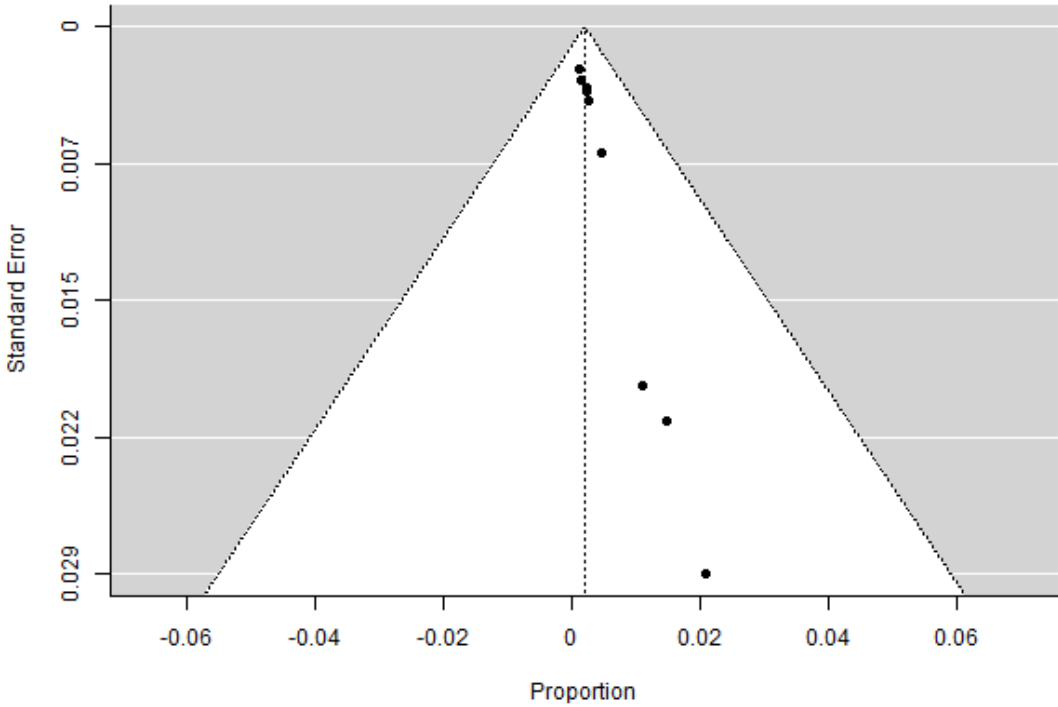
### Studies

	Mean Difference	(95% CI)
Rong 2011	8.000	(7.075, 8.925)
Mahmud 2012	5.500	(-0.534, 11.534)
Peine 2016	2.410	(2.189, 2.631)
Nathaniel 2017	6.985	(5.936, 8.034)
<b>Overall (<math>I^2=98.46\%</math>, <math>P &lt; 0.001</math>)</b>	<b>5.733</b>	<b>(2.012, 9.454)</b>



# Publication Bias Assessment

## Funnel Plot



## Egger's Test

$z = 1.175; p = 0.24$

# Conclusions

Overall, SDL scored higher than TDL



# SELF-DIRECTED LEARNING

Self-directed learning (SDL) refers to when an individual identifies their learning needs and sets their own educational objectives.

## DEFINITION

"In its broadest meaning, SDL describes a process in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes" (Knowles, 1975, p. 18).

## EXAMPLES

### Child exploration

A toddler enters an unfamiliar room and immediately begins exploring the surroundings and learning about them.

### Reading self-help books

Mika enjoys reading self-help books about how to become inspired and motivated to reach your fullest potential.

# How to master Self-Directed Learning?



# LEARNING AND WORKING **SMART**



# BENEFITS OF SDL



Teaches you to take initiative



Kindles intrinsic motivation



Builds self-confidence



Allows you to learn skills more holistically



Teaches perseverance and flexibility



Gives you the practical experience to execute what you've learned



**THANK YOU FOR YOUR ATTENTION!**

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## Key Take Aways

SDL is useful for certain competencies in undergraduate medical education

Medical students may gain more from Grouped SDL versus individual SDL

Questions

?

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Answers

?