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Extending Business TRIZ with a Function-Oriented Social Science Effects Framework:

An Educational Coaching Case

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1. Research Objectives

TRIZ effects databases offer clues from different disciplines

Organize social science knowledge into a searchable function index

Explain the theory and method, then illustrate three student cases

Develop an initial framework for mentoring and future research

Teaching Practice and the Research Question



TRIZ Summit 2019, Minsk. Photograph from the author's archive.

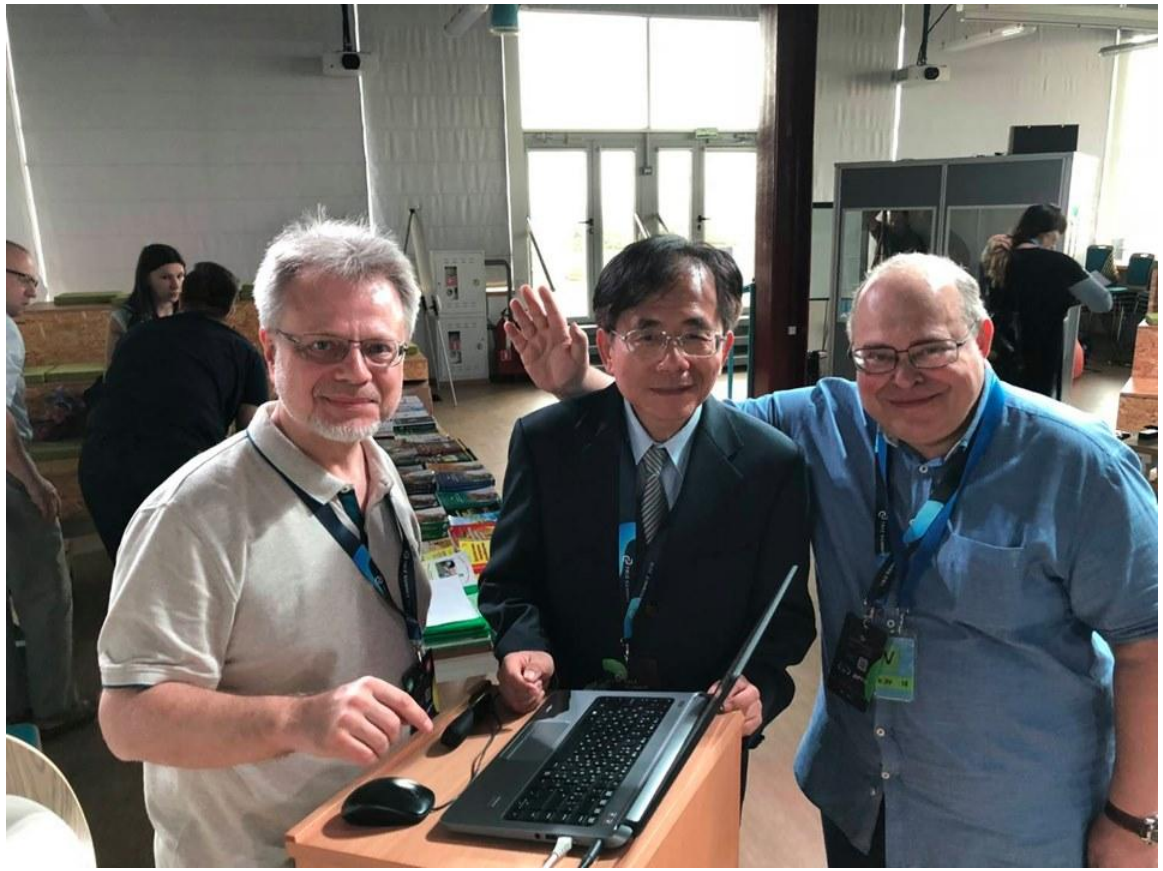
In 2019, I presented a related teaching application of Business TRIZ in Minsk.

Classroom problems call for methods that guide concrete support.

This study adds a function index for social-science knowledge.

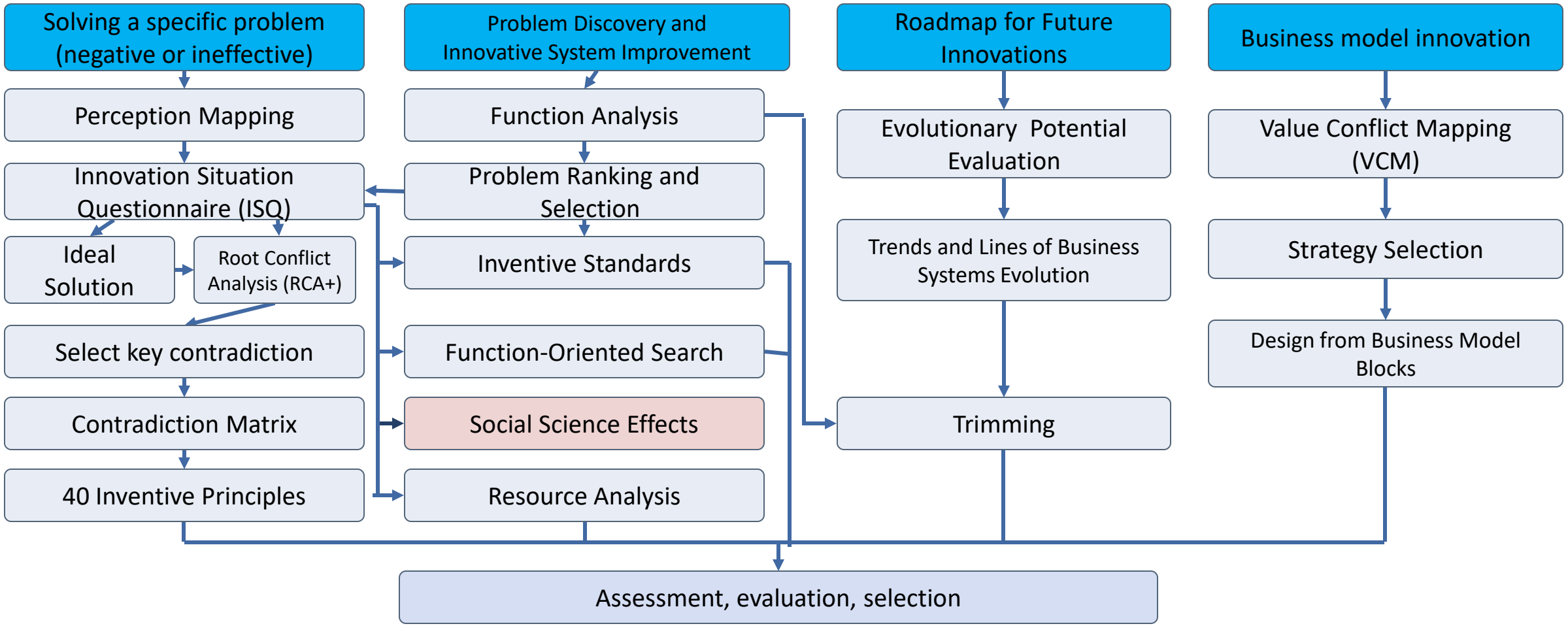
International Exchange: Minsk, 2019





Discussion with fellow TRIZ practitioners helped connect methods with teaching experience.

Business TRIZ Tool Paths and This Study



Adapted from the 2019 Beijing deck (Souchkov, 2017). Pink marks the tool added in this study.



Prior Work and the Framework's Contribution

TRIZ Body of Knowledge

Mentions psychological effects (2.4.4.7) as a category of effects, without a detailed list or procedure. Litvin, Petrov & Rubin (2007).

Psychological Effects for Management and Marketing

Kozhemyako (2016): a collection of psychological effects for management and marketing.

Business TRIZ

Tools adapted and created for business problems. Souchkov (2019).

Contribution: an expandable function-oriented framework for educational problem solving and student coaching.



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2. TRIZ Effects Databases

Collect principles, phenomena and implementation cases across fields

Translate a specific problem into the function to be achieved

Search by function, then develop a practical solution

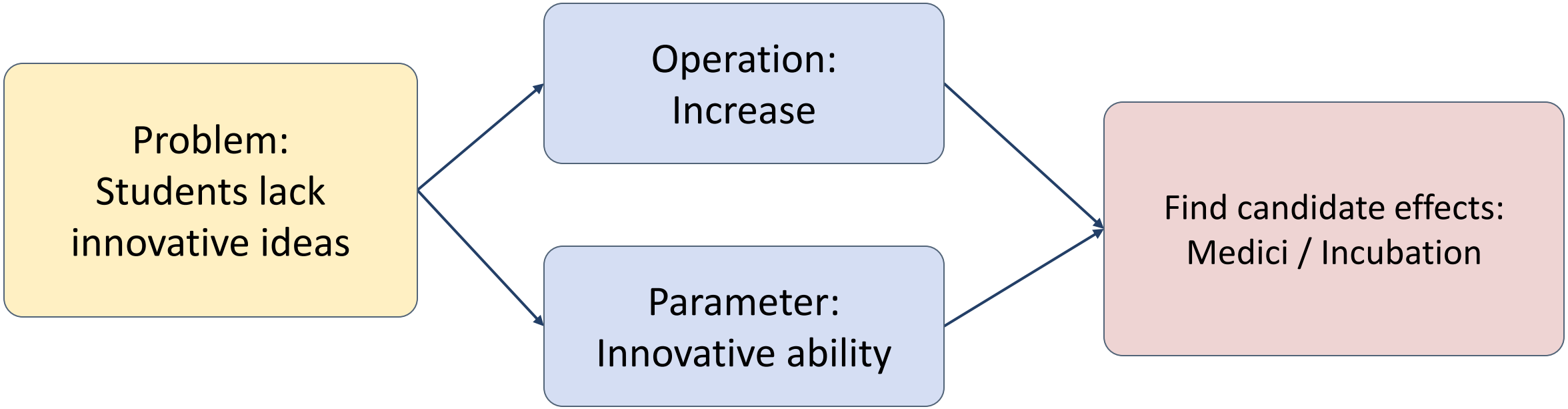
Oxford Creativity provides a TRIZ Effects Database

TRIZ Effects Database



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Function Index: Operation and Parameter



Context-specific parameters must be observable or measurable. They differ from the matrix's 31 general parameters.



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3. Knowledge Types and Evidence Levels

Level	Knowledge and evidence	Judgment in practice
A	Meta-analysis or multiple supporting studies	Check whether the findings apply to the present context
B	Research support, with limited conditions or mixed findings	Check conditions, support strategies and assessment indicators
C	Mainly a concept, model or management metaphor	Use to generate ideas, then verify and pilot the application

Levels rate research findings. The teaching practices in these tables remain the author’s proposed applications.



Key Effects: Medici and Pygmalion

Effect	Meaning	Teaching application
Medici Effect (C)	Ideas from different fields, cultures and experiences may combine in new ways	Set a shared problem and integrate perspectives. Contact with different backgrounds is a starting point
Pygmalion Effect (B)	Teacher expectations may influence learning through interaction, challenge, feedback and support	Turn judgments of potential into achievable goals and practical assistance

Sources: Johansson (2018), de Boer et al. (2018), Rubie-Davies & Hattie (2025)



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Key Effects: Suggestion, Matthew and Catfish

Effect	Meaning	Limits of application
Suggestion (C)	Indirect contextual messages may guide behavior	Understand the causes first, then examine the specific mechanism
Matthew Effect (B)	Differences in starting points or opportunities may accumulate	Provide practice and support early to avoid widening gaps
Catfish Effect (C)	An engaged newcomer may energize a group	A management metaphor. Use role-model research to examine conditions

The catfish-and-sardines story is a legend, rather than evidence from a scientific experiment.



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4. Building a Social Science Effects Database

Step	Information to organize	Output
1	Collect effects and verifiable sources	Name, description and knowledge type
2	Identify operations and contextual parameters	Searchable function index
3	Organize or design feasible applications	Actions, conditions and indicators
4	Classify by operation and parameter	An expandable database

Table 1 contains 20 entries. The appendix provides the complete set of summaries.



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Framework Fields: An Incubation Example

Field	What to record	Incubation example
Problem function	Difficulty the entry may address	Stuck while generating new ideas
Desired change	Operation and observable parameter	Increase the number and novelty of ideas
Mechanism	Why it may help	A break may loosen fixed thinking
Conditions	When it is more likely to help	After real effort, especially for divergent tasks
Limitations	What may fail or remain unknown	No universal break type or duration
Teaching trial	Actions the teacher can try	Record attempts, do a light task, then return
Source / Evidence	Author, year, link and evidence level	Sio & Ormerod (2009) McDaniel et al. (2025), level A

Six descriptive fields, plus source and evidence. The classroom trial still needs evaluation.



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Table 1: Entries Relevant to the Teaching Cases

Entry	Operation / Parameter	Possible application
Medici (C)	Increase / Cross-disciplinary ideas	Bring different expertise and cultures together, then integrate ideas
Pygmalion (B)	Increase / Learning task completion	Set achievable challenges and provide tutoring and feedback
Self-efficacy (B)	Increase / Willingness to try	Help students complete tasks themselves and build mastery experiences
Catfish (C)	Increase / Peer participation	Arrange engaged peer examples and joint practice



5. Applying Social Science Effects

1 Describe the problem → 2 Define the function → 3 Find candidate effects → 4 Check conditions → 5 Plan the intervention → 6 Evaluate and revise

can reject an effect that does not fit

Plan for the student's context. Record baseline information and follow-up outcomes.



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Steps 1–3: Define the Problem and Find Effects

Step / Time	What beginners do	Record produced
1 Describe the problem **About 10 min**	Ask the student first. Record the person, context, difficulty and known information	A specific problem statement
2 Define the function **About 5 min**	Select an operation and express the goal as an observable parameter	Example: increase task completion rate
3 Find entries **About 10 min**	Search Table 1 for relevant effects using the operation and parameter	1–2 candidate effects

Times are estimates for initial planning. Adjust them to the student's needs.



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Steps 4–6: Plan and Evaluate

Step / Time	What beginners do	Record produced
4 Check conditions **About 10 min**	Check evidence, causes and limits. Confirm the student's willingness to participate	Reasons for suitability and possible risks
5 Plan the intervention **About 20 min**	Agree on goals, tasks, responsibilities and deadlines with the student	A small plan ready to start
6 Plan evaluation **About 5 min**	Choose indicators, record a baseline, and agree on a review date and a rule for revising the plan	Before-and-after comparison and a revision decision rule

Allow about 60 minutes for initial planning. Schedule implementation and follow-up separately.



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Table 2: Ideas, Memory and Task Ownership

Problem	Candidate effect	Implementation	Evaluation
No new ideas	Incubation (A) Medici (C)	Record attempts, take a break, return to the problem. Arrange cross-background exchange	Number, categories and cross-disciplinary combinations of ideas
Cannot recall what was read	Retrieval practice (A)	Last 10 min: answer (3 min), check (3 min), correct (2 min), retry (2 min)*	Retest next week with 5 similar questions
No one takes responsibility	Diffusion of responsibility (A)	Assign an owner and deadline for each task. Check progress weekly	Tasks completed on time / tasks due

***Final 10 minutes of class:** Answer five short questions from memory (3 min), check the answers (3 min), rewrite incorrect answers in your own words (2 min), and try again without looking at the answers (2 min).



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Table 2: Confidence, Achievement and Participation

Problem	Candidate effect	Implementation	Evaluation
Low confidence	Self-efficacy (B) Matthew (B)	Identify strengths, set achievable tasks and provide early support	Task completion, self-reports and participation
Low academic achievement	Pygmalion (B)	Set achievable goals and provide ongoing tutoring and feedback	Assignments and test performance
Frequent late arrival	Suggestion (C)	Check transport, timetable or motivation, then adjust contextual cues	Weekly arrivals more than 5 min late
Low class motivation	Catfish (C)	Ask engaged peers to share and lead study groups	Submission rates and grade-level exam rank

Competition Opportunities in Teaching Practice



International invention competition achievements



University innovation competition gathering

Teaching archive photographs provide context for the mentoring cases.



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6. Case 1: An Exchange Student from Mainland China

Stage	Mentoring process and outcomes
Before mentoring	Some students showed low engagement after lunch and arrived late
Joined in Week 4	The Tianfu College exchange student arrived early and asked questions. The teacher said she need not enter the contest as she joined in Week 4. She still insisted on entering
Weeks 6–9	Registered in Week 6 and won a competition gold medal in Week 9
Later observations	The teacher observed improved classroom engagement, and reassigned Student A to another group and provided support



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Exchange Student: Application of the Method

Application field	Case details
Problem	Low classroom learning motivation and participation
Operation / Parameter	Increase / Learning motivation
Effect	Catfish Effect (C), a clue for using peer examples
Possible application	Introduce an engaged member who interacts with classmates
Implementation	The exchange student arrived early, asked questions and met the original competition requirement
Outcomes / Evaluation	Gold medal. The teacher observed improved classroom engagement

Role-model research can assess peer emulation. Other factors may explain classroom changes.



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Case 2: Student Lin

Stage	Mentoring process and outcomes
Before mentoring	Evening-division student at National Chutung Senior High School after school transfers and a training injury. Weak academic record. Already hoped to become a nurse
Mentoring	Military Instructor Chuang offered an innovation course, discussed projects on weekdays and holidays, and encouraged competition entry
2017 outcomes	Five team projects led by Lin: 1 gold, 2 bronze, 2 honorable mentions. The retrospective account records three major school commendations
2024 follow-up	Earned a nursing degree and had worked as an operating-room nurse in Hsinchu. Linked invention with clinical needs



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Student Lin: Awards for Five Team Projects

Project	Award
High-Temperature Alarm for Hand Warmers	Gold medal
Shooting Training Monitor	Bronze medal
Smart Pencil Case	Bronze medal
Temperature-Sensing Hot and Cold Therapy Pack	Honorable mention
Motorcycle Safety System	Honorable mention

The 2017 final award list records five projects led by Lin: 1 gold, 2 bronze and 2 honorable mentions.



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Student Lin: Application of the Method

Application field	Case details
Problem	The student needed opportunities to demonstrate creativity and ability
Operation / Parameter	Increase / Innovative ability
Effect	Medici Effect (C), a clue for cross-disciplinary innovation
Possible application	Exchange ideas with people from different fields and backgrounds
Implementation	Provide an innovation course, competition opportunities and repeated discussion
Outcomes / Evaluation	1 gold, 2 bronze, 2 honorable mentions. Later conceived a pressure-ulcer prevention bed

Teacher support also relates to Pygmalion. Completing projects may provide mastery experiences for self-efficacy.



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Student Lin: Candidate Effects and Limits

Candidate	Fit	Reason and limit
Self-efficacy (B)	Plausible interpretation	Completing projects and winning awards may provide mastery experiences. Self-efficacy was not measured.
Pygmalion (B)	Partial fit	Initial high expectations are not documented. Later discussion, encouragement and practical support fit some pathways.
Medici (C)	Clearer in the later idea	Inventive thinking later met clinical needs in a pressure-ulcer prevention bed idea. It remained an idea.

“The experience of inventing and competing inspired me a lot.”
Student Lin, 2024 follow-up (translated). Outcomes do not establish a single cause.



Case 3: Student Chen

Stage	Mentoring process and outcomes
Before mentoring	From a bakery family in Longjing, Taichung. Planned to work on construction sites after graduation
Recognizing potential	Youn-Jan Lin saw clear thinking, with a need to strengthen learning foundations
Practical support	One-to-one graduate-study preparation after class. Spent over 5 hours writing 6 recommendation letters
Later outcomes	Media reported top-ranked master's and doctoral admissions. He later became a university associate professor

[Educator: From a Low-Income Household to an Inventor]



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Student Chen: Application of the Method

Application field	Case details
Problem	Weak learning foundations and insufficient preparation for further study
Operation / Parameter	Increase / Readiness for graduate study, measured by preparation tasks completed
Effect	Pygmalion Effect (B)
Possible application	Set achievable expectations and provide tutoring and feedback
Implementation	One-to-one graduate-study preparation and six recommendation letters
Outcomes / Evaluation	Top-ranked master's and doctoral admissions, later a university associate professor

Turn judgments of potential into practical support. Student effort and later educational opportunities also matter.



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Comparison of the Three Cases

Case	Core support	Main effect mapping	Outcome evidence
Exchange student	Visible example from an engaged peer	Catfish metaphor (C) Role-model research Medici: possible clue	Gold medal and teacher observations
Student Lin	Course, competition and sustained discussion	Medici (C) Self-efficacy (B) Pygmalion: partial fit	2017 awards and 2024 interview response
Student Chen	Individual tutoring and access to further study	Pygmalion (B)	Media report and official faculty profile

These cases illustrate support and outcomes, demonstrate the method, and inform research hypotheses.



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7. Conclusions and Recommendations

Build an initial knowledge index using operations and parameters

Develop practical support plans, then evaluate and revise them

The cases show peer examples, innovation opportunities and individual tutoring

Expand entries, evidence and cases toward a shared online knowledge base



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Thank You

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Appendix: Table 1, Entries 1–4

Entry	Operation / Parameter	Possible application	Evidence / Limitations
Incubation	Increase / Innovative ability	Record attempts, take a break and return to the problem	A: Supported by meta-analysis. No universal break duration
Retrieval practice	Increase / Delayed recall accuracy	Close materials, recall, check and correct. Retest next week	A: Classroom support. Better recall need not mean better application
Diffusion of responsibility	Increase / Task completion rate	Assign task owners and deadlines. Track progress	A: Context matters. Check whether findings from emergency-helping studies apply to classroom group work.
Pygmalion	Increase / Learning task completion	Set achievable goals, with practice, feedback and tutoring	B: Expectations may reflect prior ability judgments. Practical support is needed

Searchable summaries. Selected sources are listed on slides 37–39.



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Appendix: Table 1, Entries 5–8

Entry	Operation / Parameter	Possible application	Evidence / Limitations
Self-efficacy	Increase / Willingness to try	Build mastery by completing tasks independently	B: Established theory. Ability and other differences affect performance prediction
Matthew	Decrease / Practice opportunity gaps	Provide manageable practice early to limit accumulating gaps	B: Mixed reading findings. Does not occur for all abilities
Hawthorne	Measure / Changes under observation	Record possible effects of attention itself	B: Conditions, mechanisms and size unclear. Change need not be positive
Broken windows	Decrease / Rule violations	Understand causes, restore order early and explain rules	B: Street studies do not directly establish school effects or justify zero tolerance

Searchable summaries. Selected sources are listed on slides 37–39.



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Appendix: Table 1, Entries 9–12

Entry	Operation / Parameter	Possible application	Evidence / Limitations
Dunning–Kruger	Measure / Self-rating vs. performance gap	Predict a score, then compare performance and feedback	B: Statistical error may contribute. Do not assume all beginners are overconfident
Impostor syndrome	Decrease / Self-doubt vs. achievement gap	Review achievements and feedback. Refer for counseling when needed	B: Measurement varies widely. Not a clinical diagnostic tool
Echo chamber	Increase / Information-source diversity	Broaden information channels and compare opposing evidence	B: Extent varies across platforms
Medici	Increase / Cross-disciplinary ideas	Arrange exchange across expertise and cultures, and integrate views	C: An innovation concept. Differences may also hinder communication

Searchable summaries. Selected sources are listed on slides 37–39.



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Appendix: Table 1, Entries 13–16

Entry	Operation / Parameter	Possible application	Evidence / Limitations
Catfish	Increase / Peer participation	Arrange collaboration with engaged peers or senior students	C: Management metaphor. Strong peers may cause pressure or withdrawal
Suggestion	Guide / Desired behavior	Use clear action cues, stories or videos for discussion	C: Covers different mechanisms. Seek specific research
Barrel metaphor	Increase / Minimum learning outcome	Find the actual learning bottleneck and strengthen it first	C: Management metaphor. The weakest person does not alone determine class outcomes
Iceberg model	Measure / Understanding of needs	Use dialogue to understand feelings, perspectives and needs	C: Adapted from Satir. Behavior alone cannot reveal inner experience

Searchable summaries. Selected sources are listed on slides 37–39.



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Appendix: Table 1, Entries 17–20

Entry	Operation / Parameter	Possible application	Evidence / Limitations
Defense mechanisms	Decrease / Defensive responses to setbacks	Build trust so students can face difficulties	C: Psychological concept. Teachers should not diagnose defense types
Butterfly effect	Guide / Key initial changes	Notice small events that could have amplified effects	C: Adapted from chaos theory. Small changes do not guarantee large outcomes
Boiling frog metaphor	Increase / Early problem recognition	Monitor adverse trends and prepare an early response	C: Metaphor. Do not cite an unverified frog experiment
Energy redirection	Change / Direction of effort	Channel high energy into sport, and talkativeness into public speaking	C: Educational metaphor. Behavior is not physical energy conservation

Searchable summaries. Selected sources are listed on slides 37–39.



Research Sources: Learning and Teacher Support

de Boer et al. (2018)

Teacher expectation interventions: review and meta-analysis

Rubie-Davies & Hattie (2025)

The powerful impact of teacher expectations: A narrative review

Bandura (1977)

Self-efficacy: Toward a unifying theory of behavioral change

Yang et al. (2021)

Testing (quizzing) boosts classroom learning

Franzoi et al. (2025)

Retrieval practice enhances learning in real primary school settings



Research Sources: Innovation and Peer Examples

Sio & Ormerod (2009)

Does incubation enhance problem solving? A meta-analytic review

McDaniel et al. (2025)

Mind wandering during creative incubation predicts increases in creative performance

Johansson (2018)

The Medici Effect (Chinese edition)

Wang et al. (2026)

The double-edged effect of cognitive diversity on team creativity

Gladstone & Cimpian (2021)

Which role models are effective for which students?



Case Evidence and Verification Sources

Official 2017 Competition Award List

Stamped PDF, p. 2. Five projects led by Lin: 1 gold, 2 bronze, 2 honorable mentions

Chuang & Lin (2024)

Teacher Award interview story and follow-up with Lin, supplied by the author

Tang (June 3, 2026), Educator

From a Low-Income Household to an Inventor: Lin’s Life Experience Inspires Students

Feng Chia University Official Faculty Profile

Chen, full-time associate professor. Admission ranks are not listed.

Exchange Student and Student A

The author’s classroom observations and mentoring account, manuscript Section 6