ANALYSED AND PROPOSED FUTURE PLAN FOR TRIZ IMPLEMENTATION, TRAINING AND TEACHING IN TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE USING 9-WINDOWS AND EIGHT TRENDS OF EVOLUTION

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TRIZ IN TAR UC

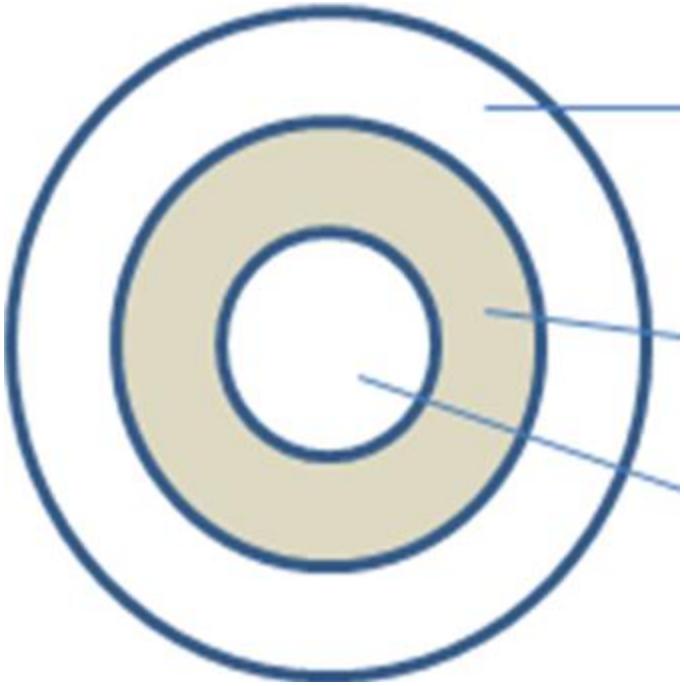
TARC
TUNKU ABDUL RAHMAN UNIVERSITY COLLEGE

2010	TRIZ was introduced in TAR UC.
2012	Champion in Malaysia TRIZ competition.
2013	Runner up in Malaysia TRIZ competition.

	TRIZ Level 1	TRIZ Level 2	Certified TRIZ Level 1 Instructors
*No. of students	913	2	2
*No. of TAR UC staff	139	15	12

* Latest update: 1st April 2014

System, Sub-system and Super-system



Super-system (Resource)

- Various industries
- Various learning institutions
- MyTRIZ,
- Ministry of Education

System

- TAR UC's TRIZ Education

Sub-system (System component)

- Instructors
- Students
- Administrators
- TRIZ module
- Facilities(Venue, time table…)

Nine Windows (Super-system)

Past	Present	Future
Super-system	**Super-system**	**Super-system**
Malaysia learning institutions: Collaboration in the area not related to TRIZ. No research in TRIZ	**Malaysia learning institutions:** Collaboration through TRIZ competition and venue for TRIZ training. Limited research in TRIZ	**Malaysia learning institutions:** Collaboration through TRIZ knowledge exchange. Extensive research in TRIZ
MQA and accreditation bodies Approved the TAR UC courses and its syllabi. No TRIZ involvement.	**MQA and accreditation bodies** Approved the TAR UC courses and its syllabi. No TRIZ involvement.	**MQA and accreditation bodies** MQA and Engineering accreditation council. (industry and academic) endorsed and approved new course set up with TRIZ module.
Industry: Collaboration with industries and enterprises in knowledge transferred.	**Industry:** Collaboration with industries and enterprises mainly in knowledge transferred, but little R&D. Limited collaboration with various industries in TRIZ related area.	**Industry:** Collaboration with industries and enterprises in knowledge transferred and R&D. High collaboration with various industries in TRIZ related area.

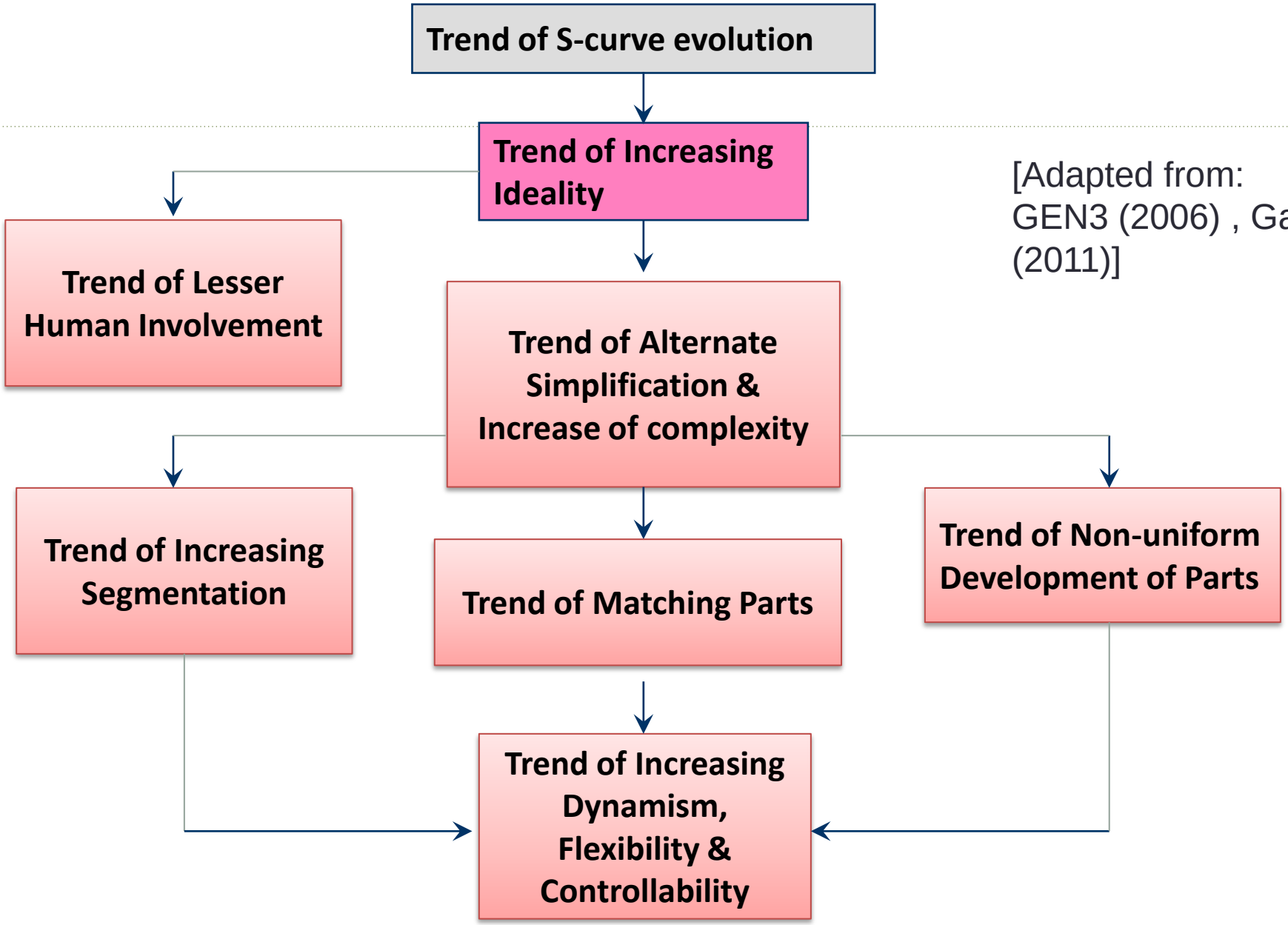
Nine Windows (System)

Past	Present	Future
System	System	System
TAR UC Priority is given to knowledge transfer. Little emphasised of creativity, innovative and problem solving. No TRIZ involvement.	**TAR UC** Emphasizing knowledge transfer creativity, innovative and problem solving. Receives and provides TRIZ training. TRIZ as extra co-curricular subject.	**TAR UC** Emphasizing knowledge transfer creativity, innovative and problem solving. Receives and provides TRIZ training. Consultancy center for TRIZ. Commercialisation center for students' product and generates income. TRIZ is embedded in every course starting with mechanical engineering follow by other courses.

Past	Present	Future
Sub-System	Sub-System	Sub-System
Administrator: No TRIZ involvement	**Administrator:** Approval for instructor to give training.	**Administrator:** Coordinate various programs, consultancy and commercialisation.
Module: No TRIZ module. Traditional module is used with hands on experience in the laboratory and industry training.	**Module:** Current TRIZ module does not show systematic step by step in the application of TRIZ tools in various problem solving. Not enough exercises and case studies. TRIZ module is based on engineering.	**Module:** Reflect systematic step by step in problem solving, with exercises and various industries' case studies. Integration of TRIZ in every course
Instructor: No instructor for TRIZ	**Instructor:** Inadequate Inexperience Receive training until level 1 instructor Offer training	**Instructor:** Adequate Experience Gone through all levels of TRIZ training Able to offer training and act as consultant to various industries

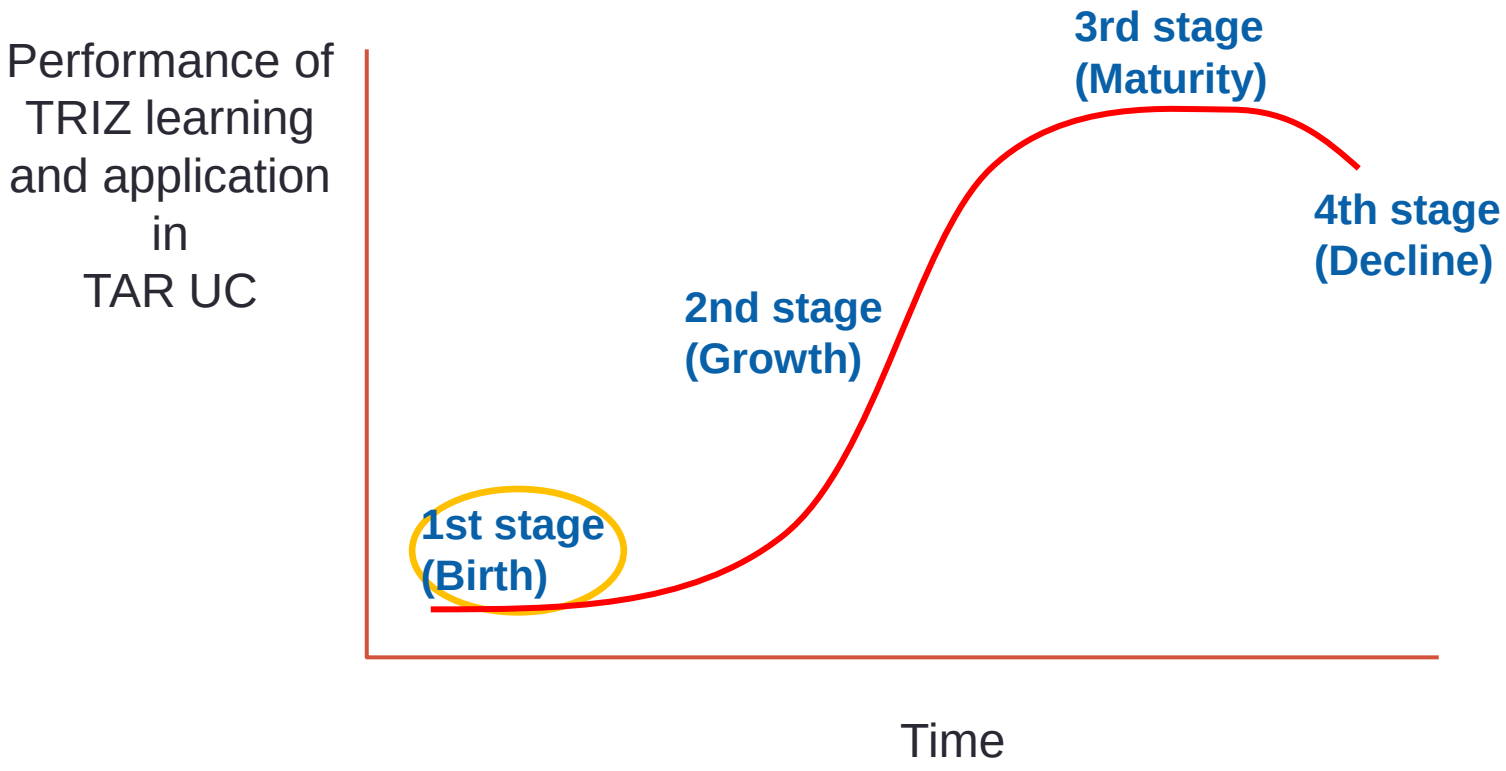
Nine Windows (System)

Student: Knowledge in traditional problem solving Students' outputs (projects and inventions) rely on traditional problem solving tools Students do not have TRIZ knowledge.	**Student:** Few trained in using TRIZ Students learned TRIZ but not fully apply TRIZ. Students' outputs (projects and inventions) still rely on traditional problem solving tools. Students do not have industry exposure to the application of TRIZ.	**Student:** Everyone trained using TRIZ Application of TRIZ is high. Students are able to incorporate TRIZ knowledge with traditional problem solving tools. Students have enough industry exposure to the application of TRIZ. Number of inventions and product designs has gone up and the possibility of entering commercialisation.
Time table and venue: No TRIZ involvement	**Time table and venue:** Students' time table and class room constrains. TRIZ workshops are held during the weekend or during school breaks. 2 days workshop. Little time to understand TRIZ.	**Time table and venue:** TRIZ lesson is continuously practiced during the normal lesson.



[Adapted from: GEN3 (2006) , Gadd (2011)]

Trend of S-curve



Indicator of 1st stage (Performance)	
1.	The TAR UC's TRIZ education lacks resources (trainer and cash).
2.	There are many unresolved technical problems. • TRIZ has yet to be studied extensively in education. The theoretical framework of TRIZ in education is lacking. • No standardized best-practice guide for the methodology in different courses. • Many teachers especially those not from engineering back ground do not understand TRIZ and could hardly use it.
3.	Environmental or non-technical requirements reduces the effectiveness of TRIZ education. • Instructors and students do not have enough industry exposure, case studies and exercises to apply TRIZ. • TRIZ may not be readily absorb and embrace by the administrators. • No endorsement for TRIZ teaching materials to be used in core syllabus.

Recommendation for 1st Stage

	Recommendation
1.	Main efforts should be concentrated on identifying and eliminating bottlenecks that prevent the system from entering the market.
2.	Work with existing infrastructure and resources.
3.	Integrate the technical system with systems that are leading at the moment.
4.	Develop the system with the intention of using it in one specific field where the ratio of its advantages to its disadvantages is the most acceptable.
5.	Analyze the physical and super-system limitations of development in order to determine the promise of a technical system

[Source: GEN3 (2006). GEN 3 training manual]

Trend of lesser human involvement

Problem	Proposed solution
Current TRIZ module in TAR UC lacks the following: • Not enough exercises for students to practice the TRIZ knowledge. • Not enough case studies to show students how TRIZ tools are used.	• Using interactive method to teach 40 inventive principles and solving contradiction. • Implement problem based learning where students take part actively in learning and TRIZ instructors act as facilitators.

Trend of alternate simplification and increase of complexity

Current situation

Conduct extra class for TRIZ learning during weekend and school break.

Proposed solution

Teach TRIZ during normal lesson.

Proposed solution (future)

TRIZ is embedded in existing course syllabus.

Trend of non-uniform development of parts

Problem	Proposed solution
1. Non-uniform experience of TRIZ instructors result in poor quality of TRIZ workshop.	Creation of a mentor-mentee system to guide the inexperience instructors by the more experience instructors.
2. The uniform TRIZ module used for training students may not satisfy the needs of different courses due to the non-uniform usage of TRIZ tools.	TRIZ philosophy is rooted in engineering. A specialized module can be designed to first cater for engineering courses follow by other courses. Conducting R and D into the learning, teaching and application of TRIZ in order to create TRIZ module that emphasized the different needs of different courses.
3. Insufficient funding in TRIZ education development.	Collaborate closely with My TRIZ, TAR UC administration, and industries to secure funding.

Trend of increasing segmentation

Problem	Proposed solution
The current TRIZ module for training students may not satisfy the needs of different courses.	Segmentation of TRIZ tools for different courses such as engineering, management, information technology and pre-university studies etc. Identify tool(s) that are most effective for each course in order to help TRIZ beginners those without technical background to achieve results quickly.

Trend of matching of parts

Problem	Proposed solution
1. Students do not have enough industries exposure to the application of TRIZ.	Matching students' TRIZ learning with the relevant industries so that the acquired TRIZ knowledge is more valuable and can be implemented more effectively. The collaboration with various industries provides a platform to promote learning and market for students' creation.
2. TRIZ education has yet to be accredited by the Malaysia Qualifications Agency (MQA)	Collaboration with other learning institutions to develop and promote TRIZ education that matches MQA requirements.

Trend of increasing dynamism, flexibility and controllability

1. Creation of TRIZ education program that is dynamic and flexible for various courses, beginner and people with non-technical background.

2. TAR UC will gradually have more control in the TRIZ education including the development and publication of certified TRIZ modules, fund generation, and internal TRIZ committee working closely with My TRIZ, MQA and various industries.

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