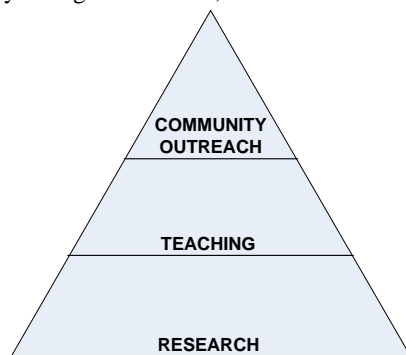


## Research Empowering Teaching for Community Development: An Example from Sport-Mathematics Research

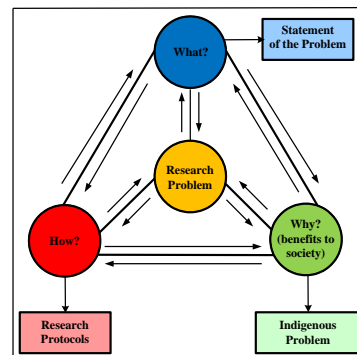
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Teaching institutions without input from research faculty working on indigenous problems and without output trickled down to serve the community they are part of may be visualized as a tree stem (teaching) without roots (research) and without branches carrying leaves (community outreach). The anatomy of a research problem consists of answering three questions — why? (benefits to society), what? (statement of the problem) and how? (research protocols). Let me quote an example from research in ‘Sport Mathematics’, where a child’s build is classified as ‘small’, ‘medium’ and ‘big’ (<http://www.ngds-ku.org/Papers/J37.pdf>) on the basis of sum of percentiles of height and mass, which are generated as part of ‘Growth-and-Obesity Roadmap’ of a child (<http://www.ngds-ku.org/Papers/J35.pdf>). In a small child, brain function dominates body function (intellectual work, planning and development tasks), in a big child, body function dominates brain function (tasks involving strength and speed), whereas a child of medium build may adapt to brain- or body-dominating tasks (<http://www.ngds-ku.org/Papers/J38.pdf>). The build of a child is, mainly, used in forming sport teams. In feats involving strength (e. g., wrestling, boxing), a big child should never be paired with a small child. It is proposed to apply the same concept in making regular (academic) classroom sections — ‘A’ consisting of small children (sum of percentiles lesser than 50), ‘B’ child of medium build (sum equal to or more than 50 but lesser than 150) and ‘C’ big children (sum equal to or more than 150). If there are children of a certain build at a given academic level (called ‘class’ in the Pakistani system; ‘grade’ in the American system), who cannot be accommodated in a single classroom, ‘Section A’ may be split into ‘A1’, ‘A2’, ‘A3’, ... and so on. Such a practice shall eliminate bullying among students. This arrangement would make it unnecessary to seat taller students on benches at the back of class, where mischief-groups are, generally, formed. In order to prevent student-groups to make trouble, keep all the students attentive and encourage them to interact beyond their own group of friends, the students should be required to shuffle seats once during a single session, making the classroom layout in configuration space (seating arrangement of students as seen in the horizontal plane — location of each student considered as an element of matrix) ‘dynamic’ instead of being ‘static’. The ‘classroom kinematics’ would, then, represent a robust, an active and an attentive classroom. The terminology ‘classroom kinematics’ is adapted from ‘team kinematics’, first used in 2007 by Frencken and Lemmink in the context of soccer games. When sections are made according to build of students, the curricula may be adapted to enhance skills of the dominating system (brain vs. body). To generate percentiles of height and mass through software employing extended height and mass tables, which include values for 0.01<sup>th</sup>, 0.1<sup>th</sup>, 1<sup>st</sup>, 99<sup>th</sup>, 99.9<sup>th</sup>, 99.99<sup>th</sup> percentiles (<http://www.ngds-ku.org/Papers/J34.pdf>), heights and masses (weights) of students have to be measured, which offer pedagogical opportunities in different disciplines, which include biology, chemistry, engineering, health and safety, mathematics as well as physics ([http://www.ngds-ku.org/ngds\\_folder/M02.pdf](http://www.ngds-ku.org/ngds_folder/M02.pdf)). The research work, not only, enriches teaching and learning opportunities, but also, serves the community by providing user-friendly detailed reports of ‘Growth-and-Obesity Roadmaps’ (<http://www.ngds-ku.org/Articles/A28/Report.pdf>) of the entire family — father, mother and all children. These roadmaps include estimated-adult height (useful for knowing if the child can serve in Army), statuses (pertaining to height) and (pertaining-to-mass), nutritional status (acute malnutrition, under-nutrition, over-nutrition, energy-channelization I-III) and 6 date-wise recommendations to achieve certain values of mass (on date of checkup for each successive month) in *kilograms* as well as *pounds* and *ounces* for the entire family. For children, 6 additional date-wise recommendations are generated to attain a given value of height (on date for checkup of each successive month) in *centimeters* as well as *feet* and *inches*. Leaders in teaching profession shall be produced by university and research-institute faculty, who have well defined research statement (outlining research philosophy, methodology, accomplishments and goals as well as technologies impacted by research — example of personal statement <http://www.ngds-ku.org/goals/Univres.pdf>), pedagogical statement (explaining teaching philosophy, methodology, accomplishments and goals — example of personal statement <http://www.ngds-ku.org/goals/Univped.pdf>) as well as community-outreach statement (eliciting community-outreach philosophy, methodology, accomplishments and goals — example of personal statement <http://www.ngds-ku.org/goals/Univcom.pdf>). Teachers engaged in pre-university teaching (pre-primary, primary, secondary, college) should, also, be required to do some research during their career and must establish deep roots with the community they are part of, to bring out a sustainable change in the minds and the hearts of future leaders of this country by making them humane, enlightened, physically and mentally strong intellectuals, who can deliver more than what is expected of them.



**Fig. 1. The hierarchy of research, teaching and community outreach**



**Fig. 2. The anatomy of an indigenous research problem**

**Keywords:** Research proposal, indigenous problem, classroom kinematics, sport mathematics

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