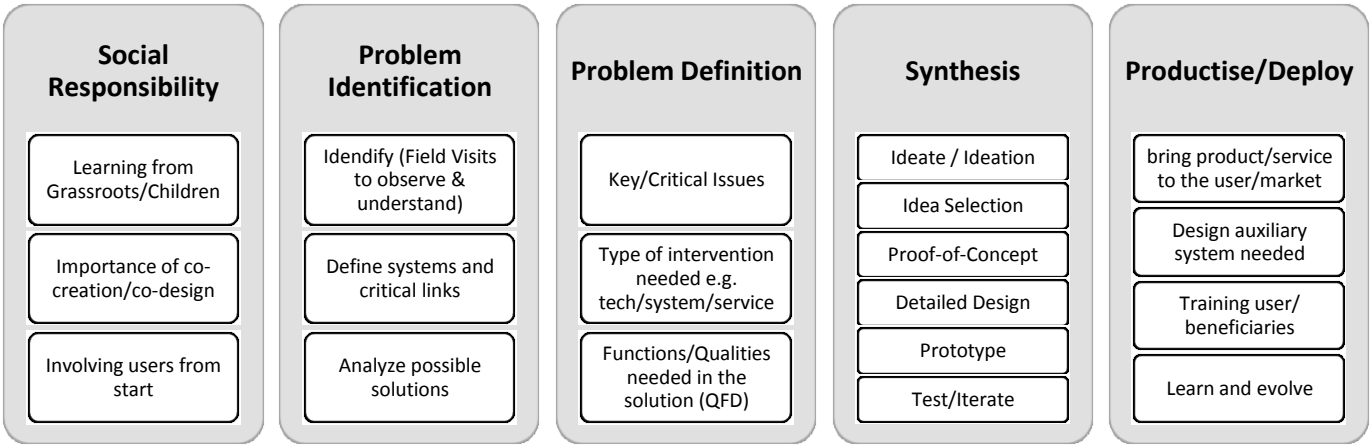
Process



1. Theme/Focus:

Deciding the theme or focus of summer school/design course. It could as broad as "Eradication of Child Labour", "Drudgery of Women", etc. or "Issues of Date Tree (*Khajoor*) Leaves Broom-Makers", "Issues of Rag Pickers", etc. or so specific like reducing drudgeries of construction worker by designing brick-carrying device.

2. Duration:

Any of the following:

- 4 Weeks or 1 month in summer and winter breaks
- Weekends during a semester i.e. about 25-30 days
- Offer an elective course on Product Design in 7th or 8th semester for Engineering Students, who have option of submitting the course output as their B.Tech project

3. Module and Curriculum:

- Designing the module with the help from mentors and design experts.
- Focus on co-creation, co-design with young minds/children, GRIs, Communities.
- Young minds/Children bring in un-biasness in thinking especially in problem identification and idea generation/ideation.

4. Location:

Depending on theme and location, an engineering college or design school with a reasonable good workshop having basic fabrication facilities such machining, welding, fitting, carpentry and rapid prototyping (if possible).
Workshop is needed specially for developing proof-of-concept models and prototypes.

5. Target Students and Selection

- From an institute/sister institutes if offered as a course.
- From multiple institutes if it is a summer school during semester course.
- Motivated student with mix of skills (such as visualization, CAD/CAE, electronics, etc.), interests and background (educational, financial, social, cultural, etc.).

6. Selection procedure

Invite entries from students to judge their interests, skills, and seriousness, etc. with focus on understand what student expects from the course/school.
Judging can be done through design assignments for social problems e.g. "Brick Carrying" or "Water Fetching" or "Seed Sowing".
Assignments should be judged on the basis of writing and expressing through visuals (doodling/sketching), animations, CAD models, etc. apart from the idea novelty, prior art research, number of ideas and storytelling.

7. Announcement and Publicity

Course can be announced in local portals of the institutes. Summer school can be announced through various portal such as Honey Bee Network, SRISTI, NIF, Techpedia, etc. and other collaborators of the organizing institute and participating institutes.
Announcement should preferably carry basic information such as date, time, venue (organizing institute), plan/brief, theme/focus, mentors, etc.
With the announcements, participants/target student groups could be made aware of social responsibilities, grassroots innovations. How and what can be learned from grassroots?

Pedagogy

1. Social Responsibility and Grassroots:

Setting up the context of summer school

1.1 Learning from Grassroots/Children

Interaction with grassroots and grassroots innovators to inspire. Preferably, innovator should be different area than summer school theme. Possibly a concurrent children workshop so that the participants see how differently an open mind e.g. child, looks at the same thing than a grown-up/trained/biased mind.
E.g. Children Creativity Workshop: http://www.sristi.org/cms/children-creativity-workshop

1.2 Importance of co-creation/co-design

A session on importance of designing and creating solution with the user, who is going to use it. How to understand the nitty-gritty of the process/system, which is being addressed/redesigned or intervened. This is one of the critical part of summer-school and might help in understand and defining problems.

1.3 Involve users from start

Involving users from the start of summer school is advised, that will make them comfortable with the participants and they might be able to understand, how and why this particular exercise is being done?
This is very first step of co-creation/design.

2. Problem Identification

2.1 Identify unmet community needs (Field Visits) (1 or 2 Days)

Spend at least a day and a night (if possible) with community. Discuss/speak/do their work with them, help them and try to learn their work.
Involve community/people in summer school/course. Participant could go to field visit with community representative.
Field visits should be planed after considering the target beneficiaries of the summer school. Why and where the particular community? How and what to do, observe and understand during field visits? What not to do? How to talk to people? People are most important part, do not forget ethnographic details (names, occupation, education, etc.). Get involved with the community rather observing from outside etc. Stay put there, work on system mapping, understand missing link and get information on missing information.

http://summerschool.sristi.org/summer-school-childrens-workshop/

http://summerschool.sristi.org/orientation-of-field-work/

Define: Define the system of the field, its entities, relations, sub-systems, etc. to understand the critical links. Map out the systems to understand why the particular problem and for whom? Finding the most critical link/issue is very important to make biggest possible impact.

http://summerschool.sristi.org/field-visit-report-summer-school-2015/

2.2 Analyse (1 or 2 Days)

Analyse the system/process and critical links/issues. Possible ways of solving the problems and issues. Benchmark with existing solutions.

If something is missing or not clear, go back again to community for second field visit. Position the problem and prepare for 2nd field visit/survey (if needed).

http://summerschool.sristi.org/orientation-of-field-work/

http://summerschool.sristi.org/brainstorming-session-by-summer-school-students/

Repeat Problem Identification steps after 2nd field visit to refine further.

Present analysis and field visit observations to peers/mentors to get critical views.

3. Problem Definition

- Define every detail of the problem
- Including key/critical issues needed to be handled/addressed
- Qualities/functionalities required
- What kind of intervention is needed, such as (a) product/technology, (b) service, (c) systems, etc. or something else?
- Define the parameters of the solutions *(http://summerschool.sristi.org/summer-school-day-8/)*
- Discuss the problem definition with peers/experts/mentors and specially community to see if you missed any point or misunderstood anything.

  ^^ Don't look for solutions yet. One should be thinking for solutions until problem is defined.

4. Synthesis

Synthesis of a solution is iterative process, need to focus on co-creation/co-design, involving following steps:

4.1 Ideate/Ideation

Most critical and important step but stay foolish in this step because:

* No limitation on thinking and imagination
* No boundaries of finances, feasibility or possibility or reliability
* Involve community in generating ideas/solutions

Generate ideas and solutions using design tools such as Brainstorming. Lateral Thinking, Artefactual, Analogic/Biomimicry, Heuristic and Gestalt Model of learning.

While ideation, one should restrict to only few ideas and should not consider any limitations such as feasibility and finances, etc.

http://summerschool.sristi.org/increasing-efficiency-while-purifying-clay-in-making-pots/

4.2 Idea Selection

Select ideas on the basis of parameters functionalities, qualities, etc. defined in problem definition.

Arrange the ideas in order of preference, if one fails then which one to work on next.

Most wild one, most feasible, most practical one, most economical one, etc.

(http://summerschool.sristi.org/improving-efficiency-and-ergonomics-of-coconut-leaves-broom-makers/)

Mentors/community/user/peer feedback

4.3 Proof-of-Concept

Make proof-of-concept sketches, drawing, animations and mock-up models. Look for possible issues in the concepts. Plan for prototype. Discuss with users/experts and take feedback to iterate this step.

(http://summerschool.sristi.org/device-for-improving-efficiency-of-labourers-in-cotton-picking/)

4.4 Detailed Design

~1 Day / ~10 Hours (with experience of fabricators/practitioners and based on rule of thumbs)

~3-4 Days / ~30-40 Hours (If going with engineering analysis)

Ground work for prototyping.

Detailed drawings, CAD models, BOM (Bill of Materials) of the concepts.

Virtual testing including engineering analysis (if possible) to look for various issues such

interference, sizing, etc. Iterate the design on basis of Engineering Analysis results, virtual tests and user feedback.
Create animations/renderings to discuss with users/experts and iterate this step.

4.5 Prototype

Prototype the product at college workshop or pre-identified fabricators or deploy pilot systems or a service.
Show prototype experts, mentors, peers. Let them use and find out possible issues/improvements.

4.6 Test / Iterate:

Testing is the first step towards moving in next stage i.e. iterations to improve and take it to product level.
Let the actual users test the prototype to understand possible issues and ways to resolve them. Take feedback and suggestions to improve it further.
(http://summerschool.sristi.org/designing-a-foldable-cart-for-mobile-vendors/)

5. Iteration

Depending on feedback iterate the process at any steps. It could be from steps 4.5 and 4.6 or it could be 4.2 to 4.6 or Synthesis steps or go back to problem definition.

6. Productise

a. Bring product/service to the user/market

b. Design auxiliary system needed

c. Learn and evolve

The Pedagogy and the process have been further explained with the help of cases from the summer school describing how students have taken up a problem, defined the problem, the process and followed a systematic approach to solve these.