Sir Dorabji Tata Trust

ITE MANUAL

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Sir Dorabji Tata Trust

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Concept of ITE

The Integrated approach to Technology in Education (ITE) was first conceptualized in September 2010 and piloted in May 2012 at the Trusts' supported project at Street Survivors India (SSI). The project has four supplementary education centres for adolescents in four villages of the Kandi block in the Murshidabad district of West Bengal. The purpose was to provide an opportunity for adolescents to interact, explore and authenticate their learning at school, using technology. Currently, ITE initiative as approved by the board of Trustees is implemented with eight organizations. [1]Seven of these serve as a resource ITE team for further expansion and quality improvement.

The integrated approach to technology in education referred here, assumes the following prerequisites-

It should be:

- student use of technology to create learning artefacts
- integrated with curriculum
- focused on learning achievement
- teacher designed instruction

Technology when it fits comfortably with the curriculum or instructional plans of teaching is an indicative of integrated technology. Thus, technology rather than an additional layer in the classroom is embedded within the design of the teacher's lesson plan and the pedagogy. Thus, in this approach, the teacher designs learning activities and students use technology to construct their own learning. For example, the students use technology for seeking information, construct and organise their learning and represent it through computer applications. Thus, the teacher plays a role of a facilitator and student as a constructionist of his or her own learning. Such an approach considers technology as a tool rather than an end itself, defines the teachers' role as a facilitator and designer of the learning environment, emphasises the student's use of technology, and authentic

[1] Child in Need Institute, Gramya Vikas Mancha, Nalanda Resource Center, People Vigilance and Child and Human Rights, Street Survivors India, Suchana the Uttor Chandipur, Vikramshila Education and Resource Centre

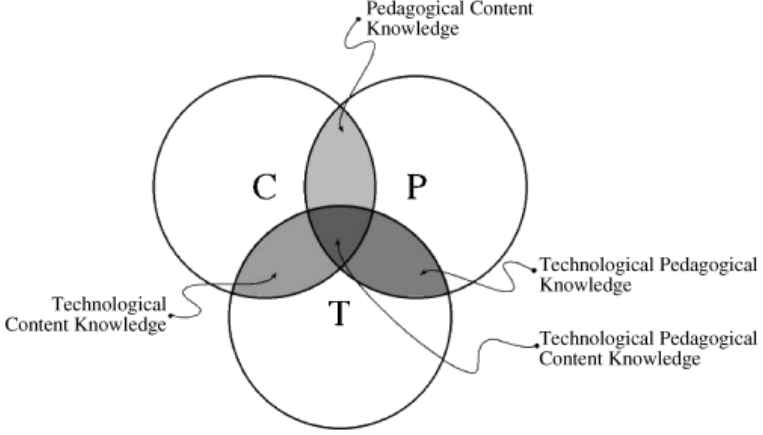
assessments and activities using technology in the classroom ([2]Grabe and Grabe cited in Charania, 2011).

An illustration of classroom implementation using ITE approach follows:

Nirmala, a learning centre teacher had designed a four day lesson plan on carbohydrates. On the second day, one group of students was busy reading a chapter on carbohydrates from the textbook, and a few in their group were taking notes. Another group was reading and discussing from some 4 to 5 printouts from different websites on the role of carbohydrates in the diet and the recent trends. The third group was at the computer station in the classroom, formatting a spreadsheet that had various columns. The first column had names of the dishes which the group members had over dinner last night, the second column had the main food ingredients in the dishes and their picture, and the third had its carbohydrate content per 100 grams. They were working on creating a graph in the spreadsheet that would compare the carbohydrate contents of various foods. The teacher went around group by group asking questions like which food has the highest and lowest carbohydrate content, what will happen if you double the amount of potatoes in your diet- in general prompting them towards higher order thinking and structuring their task.

In the example above, the technology was integrated in the curriculum and pedagogy. The teacher selected and the students applied a variety of applications that best suited the task and the learning process; in this case use of spreadsheet and Internet. Thus, technology was more at a service to the learning process and students facilitated by the teacher created a diet chart using textbook, their personal of log of food intake and technology (Internet and spreadsheet). The example above also emancipated the collaborative learning environment carefully designed and facilitated by the teacher. It is best implemented within the classroom than in the computer labs. Moreover, such an approach brings together technology, subject matter and pedagogy is therefore called an integrative approach. The theoretical framework rooted in such an approach is described below.

[2] Charania, A. (2011). An integrated approach to technology in K-12 classrooms. National seminar on information communication technology in education, department of education, NEHU, Shillong



Theoretical framework supporting an integrated approach

Teacher's simultaneous use of Technology, Pedagogy, and Content Knowledge brings into play what is known as a TPCK[3] model by Kohler and Mishra (2009), and originally based on Shulman's framework of PCK. This framework underlines that Technology, Content or subject matter, and Pedagogy are not isolated components. Successful integration is possible when the teacher assimilates his or her Knowledge of Pedagogy, Knowledge of Content, and Knowledge of Technology. This framework clearly explains why professional development of teachers in technological skills did not yield integration of technology in classroom.

Relevance of ITE approach in Trusts supported projects

It is not unusual to find teaching aids like flash cards, abacus, drawing, painting, and craft material, early reading books, blocks, and puzzles at an education project site. These concrete applications or hands-on learning tools have been proved as useful learning materials for younger children. But as the children reach pre-adolescence and enter a cognitive developmental stage of abstract reasoning, these materials cease to challenge and nurture the advent of abstract and higher order thinking skills.

Technology if used appropriately promises to deliver the learning lift required at this age group. Firstly, it provides a context which is otherwise not accessible in the real world. Thus, for example, a group of eight graders exploring the NASA website as an extension to their geography learning on the Solar System is an authentic virtual learning experience which otherwise cannot be matched through traditional ways or with TLMs. One of the live examples would be during the Trusts' field visit, a bunch of secondary students were so engrossed in finding a picture of Humayun and its tomb on the Internet which was otherwise conveniently missing in their textbook chapter on the Mughal emperor. Some of the student-

[3] Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? Contemporary Issues in Technology and Teacher Education, 9(1). Retrieved from http://www.citejournal.org/vol9/iss1/general/article1.cfm

created projects from the pilot showed student use of pictures from the Internet which had rivers, mountains and other geographical content from all over the world. This kind of exposure and application of technology is in tune with the latest learning theory for the digital age, connectivism [4](Siemen, 2004). Where connecting with information available outside one's repertoire plays a vital role in learning.

Authentic activities like students creating a video for community awareness and using the video as a tool for improving English conversations can prove to be powerful technology tools for direct impact. Nevertheless, using Internet communication tools to showcase self created technology artefacts and connect with the outside world are now plausible avenues, opening a wider scope to not only connect but also assess the live impact.

Computer and Internet as tools for learning provide a scaffolding for self constructed learning at an individualised pace. The outputs of such a learning environment can easily be demonstrated and therefore, the instruction can be any time analysed and modified. For example, the student created projects from the pilot were analysed after 2 to 3 months of the project initiation. This helped develop the next set of training for the teachers. The teachers were asked to reduce the number of projects and motivate students for more in-depth projects. The opportunities are endless and will even grow with time. The four main objectives of the ITE approach for the Trusts' projects are summarised below:

Objectives of ITE

- Bridge the digital divide and foster digital citizenship
- Create learning interest, attendance and retention
- Learning achievement
- Improve learning processes and pedagogy

[4] Siemen, G. (2004). Conncetivism, A learning theory for digital age. Retrieved December 2012 fromhttp://www.ingedewaard.net/papers/connectivism/2005_siemens_ALearningTheoryForTheDigitalAge.pdf

Bridge the Digital Divide and Foster Digital Citizenship

Most of the places where the Trusts' education projects are located, placing a computer itself in a learning centre is an incentive for the students to attend. For many children, it is their first exposure with computers. The government scheme has computer/s in government schools, but in remote areas, these are either non-existent or locked up for safety. In places where it is used, the student to computer ratio is very high and therefore, exerts not much value for existence. In some of the Trusts' projects a few computers are visible and children are often seen using paint and brush software or playing games. Bridging the digital divide also entails proficiency in technical skills ensuring a better future for the children and adolescents supported under the education projects of the Trusts.

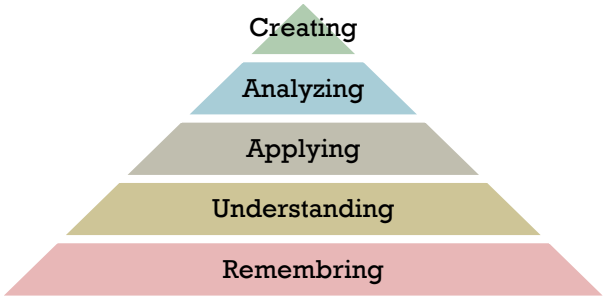
Thus, one of the objectives of the ITE project is to bridge the digital divide in all Trusts' projects and offer an opportunity to the underprivileged children to be responsible digital citizens. Digital citizenship here refers to the ethical use of technology for life-long learning and exhibit leadership for digital citizenship (NETS, 2007). The teacher training curriculum has a substantial component on the ethical use of technology both for teachers and students. The student-centered pedagogy implemented within ITE like group projects, authentic tasks will nurture leadership abilities in the adolescents to thrive and sustain as digital citizens. Using computers as a tool for their own learning will help these students grow as digital citizens ready for their counterparts raised in a digital environment.

Create learning interest, attendance and retention

There is no doubt that placing computers in the learning centres will itself bring up the numbers in the classroom/ learning centers. However, ITE is designed to create an interest in the subject matter as given in the school text books. This genuine interest in learning and the opportunity to create something of their own, using computers, cameras, and phones will attract the learner to knowledge creating resources. Also, this will, in itself make school relevant and connected with the learning centres. There is also anecdotal and quantitative data from the pilot project to support this claim. In the pilot, it was found that adolescents who would otherwise spend all their time wandering and fishing, started spending hours in the learning centre making subject focused projects.

Learning Achievement

The well known and used Bloom's Taxonomy [5](revised-David and Krathwohl, 2002) has different learning levels. Bloom's Taxonomy helps frame statements of learning expectations from students as a result of instruction. These levels are: remembering, understanding, applying, analysing, evaluating, and creating. The current situation of learning in schools stops at remembering and understanding. The ITE approach by design has apparatus to help students reach the application, analyse and create levels. However, unlike Bloom's Taxonomy, the attainment of learning levels in the ITE approach may not be linear. Students while creating a diet chart in a spreadsheet (using computer) will apply the understanding of chapter on nutrition, analyse its different components, and apply in a given problem based scenario.



Besides, student created projects, school grades can be expected to improve through this approach. Standardised tests in schools often require students to respond from remembering. However, content processed at different cognitive levels do tend to improve remembering. The pilot shows an overall positive trend in test scores.

Besides, currently work is in progress to match International Standarda of Technology Education [6](ISTE) with the ITE assessment tools. As such, the learning achievement goals will also extend to include ISTE standards. The Six broad goals for students are: 1. Creativity and Innovation, 2. Communication and Collaboration, 3. Research and Information Fluency;4. Critical Thinking, Problem Solving, and Decision Making;5. Digital Citizenship; 6. Technology Operations and Concepts.

Improve Learning Processes and Pedagogy

The technology as an information processing tool takes away the traditional information giving role of the teacher. This basic functionality of technology by default requires the teachers to take a facilitative than an informative role. The ITE approach requires the

[5] Krathwohl, D. (20002). A revision of Bloom's Taxonomy: An Overview. Theory into practice, 41 (4).

[6] NETS (2007). Retrieved October 2012 from http://www.iste.org/standards/nets-for-students/nets-student-standards-2007

teachers to play a central role. The teachers design instruction and integrate technology and then facilitate students to process the content to create learning artifacts using technology. Thus, this approach by design requires a student-centred pedagogy.

Examples of lesson plan project integration

Subject	Class	Lesson plan activities	ITE student created project
Mathematics- ascending and descending order, units of measurement	4 or 5	• Workbook exercise on ascending and descending order • Discussion of units centimetre and inches	Plot a height chart • Document height of students in their group • Plot the height and weight data in spreadsheet • Make bar charts in spreadsheet to compare the unit difference between the tallest and the shortest in the class (e.g. the difference between the tallest and the shortest in the class is 4 inches)
Geography-Weather	6	• Documenting daily local weather • Mapping different cities and towns in West Bengal • Discussion lead by textbook content and exercise • Discussion on global warming after what if activity in spreadsheet	Plot a weather chart: • Charting the daily documented local weather in a spreadsheet, coding days of extreme weather. • Averaging local weather. • Seeking average weather of neighbouring towns through Internet • Plotting average temperatures of different cities and plotting comparison charts in excel • What if activity: Exploring a 5 percent increase in 5 years formula for cities which are closer to industries
Regional Language-	7	• Narrating poems by the	Make a life history album

Famous Poets		famous poets • Discussing poets' life histories from textbook and other sources • Creating your own poetry, a writing session in the classroom	• Students in groups or individually pick their favourite poet and make a multimedia presentation on the poet's brief history and his/her 5 most famous poems. • Guided tour of Internet search for more poems is recommended. The multimedia presentation can use the regional fonts.
Geography-Solar system	6	• Solar system model demo • Textbook reading and discussion • Discussion on gravitational force and it's relation with solar system. • Discussion after or during ITE activity about why weight differ on different planets	Make weight charts for 9 planets • Children documenting their weights • Use NASA website to compare your weight on different planets • Document your weight on each planet • Use spreadsheet to plot these weights and compare weights on different planets using charts. Add challenge if it is a 8th class or up activity: Use NASA website to find only one students' weight on different planets. Figure out the ratio of weight on earth to other planets e.g. 2 x wt on earth= wt on Jupiter). Use this ratio formula to derive weights of all the students in your group on different planets. Use spreadsheet formula operation to complete the weight charts of other students on different planets.

Implementation guidelines

The following implementation guidelines have been chalked out based on the pilot ITE project at SSI, frequent training and communication with SSI teachers and technology coordinators, and the trainings with also the organizations in the ITE consortium.

Roles of the key personnel

ITE is layered with the current administrative patterns of the projects. These patterns are Supplementary education centres, within school, within madarsas, and at residential bridge course in adolescent education project. The ITE initiative is implemented within these patterns adapting the existing teacher pool and administrative pool, new recruitment is more need based and differs from project to project. In a non layered project, the teacher still remains at the heart of ITE. The main role of the teachers is to make lesson plans with integrated technology as student projects and activities to aid learning. The teacher also collaborates with the technology facilitator who aids children in making projects. In some projects this role is also performed by the teachers with some aid from a techie who maintains the machines. Besides the teachers, the technology facilitators will coordinate with teachers to match student projects with lesson plans, facilitate students in making projects and trouble shoot technology issues. There will be one appointed liaise with the Trusts for feedback and data on ITE.

Administrative tools

To track teachers' lesson plans and the correspondent student created projects using technology, ITE student and teacher log books can be used. These logs are annexed and can be printed as booklets for student and teacher use for ITE. Besides, the ITE assessment tools are in process and will be included in the revised version of the manual.

Student portfolios: Besides student log books documenting student made projects, it is required that the teacher or the technology coordinator prepares electronic folders for each child and enforce a system whereby, student projects are systematically saved in individual student folders. Such documentation per student will help overview student projects and progress overtime.

Feedback and showcase platforms

Two masters' level interns University of California Berkley were placed at the pilot project. One of the suggestions received by these interns was the students made projects are

intensive in terms of time and efforts, however, creating one after another without receiving any substantial feedback could lead to decrease in motivation over time. They suggested feedback loop between teachers/technology coordinators and students on their projects. This feedback can be simply verbal motivation by teachers, a written feedback in students' log book, providing opportunity for students to share with other students, parents or a community gathering,

Technology related guidelines

Computers, ratio and space

Ratio: The student projects are mostly created in groups. However, more than 3 students at a computer should not be encouraged. Besides, individual projects should be motivated. In which case, the time table of the centres should be adjusted to adjust the low computer to student ratio. Extended hours of the centres provided for completing projects with some adult supervision can also be explored.

Space: As per the research in computer us en schools, an ideal scenario is to place computers within the classrooms to facilitate integration within the classroom activities and curriculum. However, in the current scenario labs are used in all the projects. This is to accommodate lack of space in the classroom and high computer student ratio. Placement within the classroom can be considered after a few years of implementation.

Desktop versus laptops: It is entirely up to the organizations to purchase either the desktops or laptops. The first pilot had used desktops as the organization felt sturdy and grounded machines will keep security issues at bay within the centre. One the other hand, during the master training, one of the organizations decided to buy the laptops so that it can be locked in a cupboard together for security reasons. At some of the new organizations, laptops have been explored also for its mobility so that it can be used at more centres within the suggested computer ratio. Overall, most of the new organizations have purchased a mix of desktops and laptops.

Software: The ITE initiative focuses on student creation of projects using technology, whereby ready educational software is barred for use at this phase. Open office or its equivalent, or a licensed copy of Office can be used for student creation of projects.

Internet security and ethical standards: The technology coordinators can conduct a small session with teachers and administrators on Internet use. This should include what is safe use, Internet use timings, adult supervision during student use of Internet, what filters have

been installed and which websites are blocked, rules on use or no-use of social networks by students and teachers, separate after hours for teachers if required to use computers, steps to be taken like reporting to authority if an appropriate use like pornography is detected.

Besides security, students should be prepared to quote the web source for ideas and text used for their projects. The concept of plagiarism should be explained and an environment for digital citizenship should be modeled and fostered.

Power issues: The pilot project had encountered power issues due to seasonal agricultural activity. Thereby generators were deputed to solve power issue. Henceforth, all ITE budgets include a budget line for power backup. This could range from generators to solar alternatives depending on the location and preference of the organization. In future, a technical partner will be allocated responsibility to guide power solution alternatives for ITE.

Insurance: Organizations are required to insure all the computers and other hardware against malfunction, damage and robbery. The consortium organizations can be contacted to explore best deals and general rules of insurance.

Following is a template of administration which will help organizations to create an administrative plan for ITE:

Administrative Template for ITE

- Roles
    - Who will train teachers? How many trainings per year?
    - What will teachers do?
    - What will technology coordinator do?
    - Who will be ITE liaise person with the Trust?
    - Who will prepare and who will supervise documentation tools?
    - Who will trouble shoot technical problems?
- Set up and scheduling
    - What age groups starting 10 will receive ITE?
    - How many centres?
    - Where will the computers be set? Why?
    - Time table integration for ITE, what adjustments will be required.
    - Centre timings and adult supervision after hours
- Coordination

- How will teachers and computer facilitator coordinate for student projects?

- Projects:
  - Computer student ratio? If very high, how will you solve it?
  - How many lesson plans per month with integrated ITE?
  - Feedback types for projects
  - Showcase activities of students-how many per year and type?
  - Internet security and ITE ethical standards for students and teachers
  - How will you handle technical problems?
  - How will you handle electricity power problems?
- Assessment
  - When will you conduct baseline assessment?
  - Schedule of assessments in a year.

Teacher training guidelines

Teacher training for ITE should cover the following components:

1. Concept of ITE
   a. What is it not?
   b. Understanding ITE through TPCK model
   c. How will ITE impact teaching and learning
   d. Value of ITE in terms of authentic learning, constructive learning, and connectivism with outside world
2. Ethical use: Internet use and security,
3. Lesson plan practice followed by practice of student made project
4. Prepare 3 months work plan for integration
5. Basic/initial applications of ITE for creating student projects:
   1. Creating Desktop Publishing
   2. Creating Spreadsheets
   3. Creating Multimedia
   4. Crating Video making
6. Documentation tools: lesson plans, ITE student and teacher logbooks, data collection on assessment tools.
7. Feedback mechanisms for students

8. Platforms to showcase student created ITE projects
9. Assessment of projects
10. Implementation plan, administration rules and time management
11. Discussion on roles of different personnel at the project to implement ITE

Assessing the levels of teachers will help gauge the length and depth of session at the training. Following are some of the tips based on learning during the direct teacher trainings conducted by SDTT:

- Lots of hands on integration practice with lesson plan, followed by teachers taking the role of students to create ITE projects based on the lesson plans.
- Each teacher should make one lesson plan and one student made project per application.
- Start with two or three applications only.
- Get teachers to make 3 months work plan per training
- Discussing each personnel role for clarity
- If teachers successfully create projects during the training, they will be in a position to levy trust in their students to create projects using technology
- Coordination between teachers and the person helping students make projects is a must. Therefore, a fixed schedule for regular meetings between the teacher and technology aid needs to be discussed during the meeting.
- Frustration within teachers who are novice to using computers is expected. Need patience and perseverance to get all teachers complete lesson plans and student made projects at the training?

Annexure 1

Additional reference for trainers: What is learning?

Outline on Concept of learning and learning theories:

- What is learning?
- How does learning take place?
- How do children learn?
- Do children at all ages learn in the same way, why?

A relatively permanent change in behaviour due to practice and experience. Changed behaviour, how does this behaviour change?

From the lenses of learning theories

1. Behaviourist: Classical conditioning and reinforcement. External stimuli-Black box. Example: test scores; athletic training
2. Social cognition: Modelling and imitation. Example: Grooming at early age
3. Cognitivist: Learning occurs with information processing mechanism of the brain-Internal processes. Schemas-accommodation and assimilation
4. Constructivist: Learning occurs by constructing personal meaning with objects and reality
5. Connectivist: Learning occurs connecting information nodes from outside world-information age-digital information

Types of learning

- Rote learning: Memorization and retrieval
- Discovery learning: Student discovers or uncovers what is to be learned.
- Meaningful learning: Occurs where new experiences are related to what a learner already knows. Find connections with what they already know.

Levels of learning

Bloom's taxonomy: For details refer to www.celt.iastate.edu/teaching/RevisedBlooms1.html

Relation of learning theories with idea of education by some of the great men

- Where does Paulo Friaries' idea of education fit?
- Where does the idea of education of our great leaders like Gandhiji and Tagore fit?

Why ITE at 10 years of age?

- Cognitive stage theories- Refer to Piagets' stages of development and focus on abstract reasoning stage.
- Is cognitive development less in children, or are children miniature adults?
- Characteristics of adolescents, how does it affect schooling and learning?: Refer to http
- What is the unique value of ITE at this stage?
- What mostly happens at 10 years of age in our Indian school system?
- What other characteristics of ITE can facilitate with that of an adolescent?

Annexure 2

ITE applications-Phase 1

Note: All applications are for Student created learning artefacts

Application 1: Desktop Publishing

- What is DTP? Where can it be used by students?
- What kind of learning will happen?
- Bloom's taxonomy level:
- Possible student projects: Structure of atom, Value of using desktop Publishing.

Application 2: Spreadsheets

- What does it do?
    - Calculate
    - Put formula
    - Compare through charts
    - Ask what if questions?
- What concepts can your students learn by using spreadsheets? Value?
- Where can it be used by students?
- What kind of learning will happen?
- Bloom's taxonomy level:
- Possible student projects: Density, ht and wt, speed, average/interest

Application 3: Multimedia

What is multimedia? Different kind of media-picture, video, text, graphic, audio and video

- Where can it be used by students?
    - Where use of multiple media ensures deep engagement for meaningful learning.
    - Textbook representation un-justifies meaningful learning.
    - Where the subject matter has multi dimensional aspects. Example, pollution, biology, nutrition.
- What kind of learning will happen?
- Bloom's taxonomy level:
- Possible student projects: Many

Application 3a: Digital story making

- Uses multimedia applications
- Purpose: Creativity, story making skills
- Value of digital: Easy pictorial representation, easy publishing, range of selection of graphics, speed, hyperlinks, surpasses skill of drawing, skill of elaborate writing.
- Where can it be used by students?
- What kind of learning will happen?
- Bloom's taxonomy level:
- Possible student projects: Languages and history

Application 4: Video making

- More in-depth involvement in subject matter
- Authentic learning-real life situation
- Sense of create something
- Understand media can be created-therefore can be questioned
- What does it involve?
    - Scripting-scene wise
    - One minute video takes-one hour of scripting
    - Video shoot from real world
    - Can also use still pictures
    - Use existing videos-only for educational purpose. Always give credits.

SDTT-ITE log book
For Students
(Student picture)

Name of the Organization
Year 2013-14

Name of the student:
Name of the centre:
Age:
Class in school:

Month _____2013

Name of the project	Names of other students if made together	Chapter name and pg no.	ITE Application	Starting date	Completion date	Tr remarks

SDTT-ITE log book
For Teachers
(Picture of the Teacher)

Name of the Organization
Year 2013-14

Name of the teacher:
Name of the centre:

Month _____2013

ITE lesson plan name	Chapter name and pg no.	Application required	Class/level	Duration of project with date	How many student projects were completed	Number of students who completed

Remarks of the supervisor/tech coordinator on the lesson plans and the quality of the student projects: