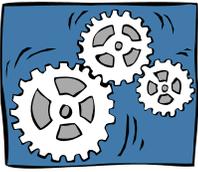# LEGO ROBOTICS DAY CAMP

Logistics, Facilities & Personnel

Prerequisites and Assumptions:

The curriculum as written assumes:

- 5 consecutive days
- 7 hours per day with campers; setup/takedown/staff time before and after; we did 9:00 – 4:00
- Minimum 1 hour lunch plus morning and afternoon snack
- Campers will attend all days, all hours – no drop-ins
- No more than 24 campers per session – otherwise lecture ("Circle Time") and chaos control become too cumbersome
- Most campers are novices – no Lego Robotics experience
- Campers can read; they may need help with some materials
- Small "labs" of 3 students will work together
- A ratio of Program Aides (experienced, older kids who have at least one year's experience on a FIRST LEGO League (FLL) team and have gone to a tournament) of no less than 1 PA per 6 campers.
- PAs and Director/Instructors receive advance training
- Ratio of no more than 3 campers per 1 Lego kit containing at least 2 (preferably 3) motors, 2 touch sensors, 1 (preferably 2) light sensors and 1 RCX, plus lots of gears, beams, axles, etc. as are usually found in Mindstorms or Team Challenge kits.
- At least 1 additional Lego kit is available for demos and teaching constructs. We have also always had at least 2 spare parts kits.
- Ratio of no more than 3 campers per 1 computer/laptop (1 per lab) capable of running Robolab 2.5 and supporting a Lego tower (serial or USB – to match what is available in the Lego kits!)
- Campers will be provided with individual notebooks for notes and handouts that may prove useful if they subsequently join an FLL team.
- The Camp Director/Instructor will modify the length/content of lectures, the giving of handouts, the assignment of tasks, the order of the curriculum, the number of playbreaks, and the difficulty of missions to suit the character of the particular group.
- The last afternoon (Day 5) is an exhibition for parents and family.

Logistics, Facilities & Personnel

Physical Facilities:

Our experience is that the ideal facility is:

- Well-lit, well-ventilated, isolated from interruption and through-traffic, close to restrooms and a play area that can allow large motor activity.
- Large enough for each lab to have a table that can seat at least 4 comfortably – plan on the Lego kit and computer to take up the space of a person.   Allow for traffic space between tables for PAs, parts-getters, troubleshooters.
- Large enough to allow a "Circle Time" area, preferably with a whiteboard or easel. Don't try to lecture to kids with a Lego kit within their reach.   Kids respond better to visual aids such as posters, whiteboards, paper easels and Lego constructs than Powerpoint slides.
- Can be locked so that computers are safe and camp can be left set up overnight.
- If the room(s) will be in use outside of camp hours, then relatively easy access to a locking storage closet is essential for the security of computers, kits, and half-constructed robots.
- Has an area that can be cordoned off for "PA Paradise", to which the PAs retreat during Circle Time, break time, and where they can keep their stuff.   A table or two, a large sheet, and a display board set up in a corner works.
- Can tolerate the noise levels of lectures, many conversations, and daily games.

Some problems that we have experienced with facilities include a college upset with sidewalk chalk decorations and noise levels; too large a room isolates some labs from observation and makes lecturing ("Circle Time") difficult; too open a room provides too many distractions; having to setup and teardown every day increases wage expense and/or decreases camp instructional time; a block-long walk to the "nice" playground made impromptu play breaks unworkable.
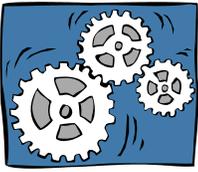
Logistics, Facilities & Personnel

Program Partners:

Many community centers and organizations such as Boys and Girls Clubs or Police Activities League may be willing and even anxious to partner in offering a Lego Robotics Day Camp. Our experience is that these organizations foster a "drop-in" mentality and tolerate a higher level of chaos than works for Lego Robotics Camp. The discrepancy needs to be recognized and addressed in advance, as does keeping campers separate from other populations. These places often offer before- and after-care, inexpensive lunches, staff with First Aid certifications and generally good security, which greatly enhance the program.

One invaluable partner, in our experience, is our local FLL tournament program. In Oregon, the state university system maintains an outreach office (ORTOP - Oregon Robotics Tournament Outreach Program) that organizes the local tournaments and supports training for adult volunteers. We send our Director/Instructors to their training, borrow their equipment, and call on their expertise and community connections. If you can find a local equivalent, your load will be much lighter.

Personnel:

Our typical staffing for a session of 24 campers was 2-3 paid adult directors, 4 Program Aides (or adult volunteers filling this role) and several part-time adult volunteers to help supervise campers separately from PA's during lunch and play breaks.

The ideal skill mix for Directors, Instructors, and Adult Volunteers is:

- FLL Lego Robotics team Coaching/Mentoring experience
- Enough computer expertise to troubleshoot programming stations (usually Windows laptops).
- Enough technical expertise to understand the curriculum well enough to teach it (with exceptional PAs, this can be delegated).
- First Aid/CPR current certification (or a facility with on-site staff).
- Rule-compliance for checking kids in/out, monitoring forms,
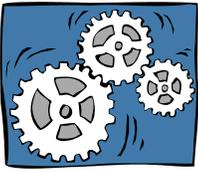
Logistics, Facilities & Personnel

medication, and adult to camper ratios.
- Enough Girl Scout expertise to help curious girls and parents/leaders to determine which badges are relevant.
- Troubleshooting – for personnel, hardware, and logistical problems.
- Kid-herding – the frustration level may be higher than at most day camps, and the opportunities to limit some personality conflicts less. Our best person so far on this front was a Kindergarten teacher.
- Enough bodies to leave at least one (preferably two) adults with the PAs at lunch and break times, to maintain the GS-mandated ratios and ensure the PAs a break from the campers AND have at least two adults with the campers, preferably in the play area.
- Organizational skill and attention to detail, especially for pre-camp preparations.

We've had Mom/volunteers who have coached FLL teams; an experienced Girl Scout leader whose daughter had been on a team; a newly graduated Kindergarten teacher; a high school grad about to start college in Computer Science; a grad student with an MS in Mechanical Engineering; out-of-work software, hardware, and Quality Assurance people; and prospective coach/parents who have done very well.

Adults tend to monitor activity to head off trouble, provide heavy discipline when the PAs are unable to redirect undesireable behavior, gather group feedback from Circle Time sessions and individual PAs, volunteers, and lab interactions. Ideally, PAs provide most of the mentoring interaction with campers.

The ideal Program Aides has the maturity and discipline to interact with a small group of campers with patience and kindness; to downplay or ignore personality clashes she may have with campers; to encourage the campers to discover answers and persevere rather than providing answers and doing things herself and to remain engaged and available even when campers are mostly working on their own. A Program Aide should not touch the robot, run programs, or sit at the keyboard unless troubleshooting. Asking leading questions, prompting recapitulation of Circle Time discussions and handouts, and encouraging trial and error are the preferred teaching methods.

At least some of the PAs need to be outgoing and high energy enough to run games and icebreakers to give campers breaks and variety. Some PAs (preferably all)
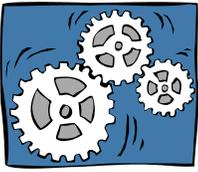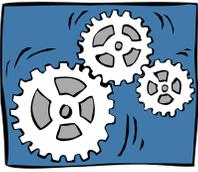
Logistics, Facilities & Personnel

need to have enough self-confidence to be able to participate and/or lead songs and silly skits.

We have had issues with PAs who taught things using different tools or methods than those in the curriculum, which can make it more difficult for someone else to step in and help; PAs who are very low energy tend to have groups who are more isolated; PAs who are too hands-on tend to have groups who persist in needy behavior and lazy thinking; PAs who are too social or distracted by books or computer games tend to have groups that are also not on task or succumb to personality issues.   Training helped us to overcome some of these issues; better training and clearer behavioral expectations explicitly stated should help even more.

We were lucky to capitalize on a core group of PAs who worked both years in a professional manner worthy of a teacher with several years' experience. We used them in curriculum critique and training new PAs as well.

Pre-Camp Purchasing/Acquisition:

- ❖ Minimum 8 Computers capable of running Robolab 2.5
- ❖ Robolab 2.5 License/distribution CD – see www.pitsco-legodacta.com
- ❖ Lego kits, including IR towers compatible with computers - ditto
- ❖ 2 FLL-standard tournament tables
- ❖ 1 or 2 FLL tournament mission mats and tabletop constructs, with assembly instructions if possible. Nice to have two different years' missions.
- ❖ 9 binders for 8 team notebooks and a master, to hold up to 36 pages each
- ❖ 1 large binder for a Photocopy Master of all materials
- ❖ binders for Technical Mentor notebooks, to hold up to 50 pages each
- ❖ sheet protectors for above
- ❖ 1 large binder for technical documentation; zippered works well.
- ❖ Registration box (medium portable file)
- ❖ Name tags for each director, volunteer, PA & camper
- ❖ Small binder for confidential camper registration & medical forms
- ❖ First Aid Kit
- ❖ Paper towels and facial tissues
- ❖ Filler paper – 5 sheets per camper, plus extra for notes
- ❖ Pencils – 1 per camper plus extras

Logistics, Facilities & Personnel

- ❖ Pens – at least several; we got complimentary ones and sent them home with campers.
- ❖ Binders or bradded folders, 1 per camper, to hold up to 25 pages each
- ❖ Stickers or labels for decorating camper notebooks; we also used full sheet (8.5x11") adhesive labels, 1/2 sheet per camper, to avoid the use of permanent markers on plastic notebooks.
- ❖ Small stickers for scoring missions at exhibition, at least three types - smiley faces, stars, hearts, Good Job teacher stickers in the packs of 300+ at office supply warehouses.
- ❖ Copy paper – lots.
- ❖ Cardstock for signs, certificates and mission cards
- ❖ At least 4 blindfolds
- ❖ A large bag of rubber bands
- ❖ At least 8 chopsticks
- ❖ A couple pounds of mixed, kid-friendly, small pieces of candy
- ❖ A small container to hold candy to hand out as prizes (hide the big bag).
- ❖ A medium to large plastic archive hanging file box for camper handouts.
- ❖ Several large plastic, lidded, stackable bins for tools; documentation; notebooks, Lego tournament mission tabletop constructs and miscellaneous storage.
- ❖ Small plastic sorting trays – styro meat trays (dishwashed, no cracks!) work well, as do margarine tubs, etc. Nice to have 2-4 per lab (up to 32).
- ❖ 8 20"x24" stiff display boards – stratocore, from art stores, can be used again and again. I enlarged selected handouts, taped them to one side of the board, then covered them with Contac paper for use during the week, then used them for each lab's display at the exhibition.
- ❖ Display board or screen for PA Paradise – I used cable ties to connect three Stratocore boards into a triptych. The PAs decorated it by taping on papers and post-its.
- ❖ About a dozen gallon-size Ziplock bags for kitting
- ❖ Crayons, markers, scissors to kit in Ziplock bags, one per lab for use in decorating lab notebooks and creating exhibition posters
- ❖ Butcher paper – for exhibition posters, and sometimes to cover windows to provide protection from distractingly curious sightseers (i.e., boys)
- ❖ Adequate power strips and extension cords for the facility
- ❖ Duct tape for electrical cord control, depending on the facility
- ❖ Blue masking tape (7 day quick-release) for signs, putting down lines on the floor for acting out robot algorithms, crowd control
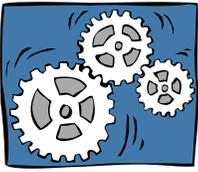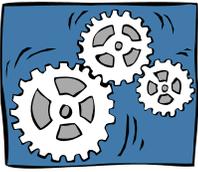
LEGO ROBOTICS DAY CAMP

Logistics, Facilities & Personnel

❖ Can Do mats – ideally a flat wrinklefree white surface with a circle outlined in black, about 3' diameter with the line about 1 inch thick. Shower curtains marked up with Sharpies are ok but wrinkles and tears can cause problems.   Vinyl tablecloth material marked with paint markers or Sharpies tends to transfer pigment over time. A thin flat panel of masonite or smooth fiberboard painted white then painted or marked with electrical tape is long-lasting and wrinkle-free but can warp if not stored carefully.

❖ Refreshments for Exhibition day – plus cups, napkins, serving plates, pitchers as needed

❖ Outdoor toys – jump ropes, sidewalk chalk, bubbles, balls, frisbees

❖ Swag – beloved of PAs, adult volunteers, and occasionally campers

❖ Access/use of a digital camera and a color printer for certificates

Pre-Camp Preparation:

❖ Instructor Review:
  o Review all curriculum materials & make teaching notes; I just use the 5 day curriculum (see LRCCurricrev2.doc & .pdf).
  o Decide on which pages you want in the Technical Mentor, Team, and Camper notebooks. The Team and Camper notebooks are deliberately different to encourage campers to look in more than one set of documentation for the answer/help!   If you change our configuration, you will want to change the lists of contents documents.
  o Choose handouts for enlarging and posting on display boards (optional).
  o Arrange personnel training, especially for PAs
  o Additonal materials you may wish to review are available with the Lego kits, the Robolab CD, and at these websites:
    ▪ www.ortop.org - Oregon Robotics Tournament Outreach Program; many useful links, organizational aids for kits, Best Practices for Coaches document is useful even for camp situations
    ▪ www.hightechkids.org - good training materials, mostly aimed at adults
    ▪ www.ceeo.tufts.edu/robolabatceeo/k12/ - teacher training materials aimed at all kinds of Lego robotics, not just FLL competitions; the Robolab reference manual is available here
    ▪ www.firstlegoleague.org - the scoop on the challenge; look around,
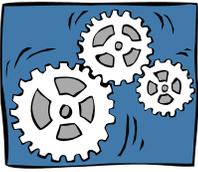
Logistics, Facilities & Personnel

lots of good downloadables, including Scooterbot instructions.

❖ Registration box (a medium sized portable file box works well).   This confidential information should be well-secured during and especially after camp:
  o Camper registration forms
  o Camper health forms
  o First Aid Kit
  o OTC medication forms & space for meds
  o Camper, PA, and Adult volunteer Name tags
  o Markers and blanks for name tags
  o Camper checkin/checkout sheet for each day
  o Paper for notes
  o Pencils/ pens
  o Placement Questionnaires to hand out Day 1
  o Any announcements to go to parents

❖ Handouts box (a large plastic hanging file box works well):
  o Enough copies of each camper handout, plus a few extra, in the order that they will be handed out.   The distribution CD has all the necessary documents.
  o Filler paper

❖ Technical Documentation box (a large plastic bin works well):
  o Robolab Reference manual (download)
  o "Art of Lego Design" by Fred Martin (download)
  o any of various InSciTe manuals (download)
  o any of various books on Lego Robotics
  o Constructopedias, if not kept with kits
  o Team Notebooks, assembled with pages in sheet protectors, enough for one per lab and a master for quick photocopying.   These need to be monitored occasionally for page order and completeness.   The distribution CD has all the necessary documents.
  o Small box with Icon Bingo boards and counters.
  o Extra batteries – usually no more than 6 per lab (48 total) per session; if using rechargeables, be sure they are 1.2V and supply a battery tester (Radio Shack has a $10 one) and compatible chargers.
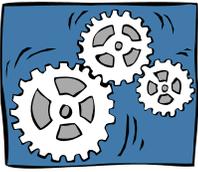
LEGO ROBOTICS DAY CAMP

Logistics, Facilities & Personnel

❖ Crafts/Toys box:
  o Butcher paper
  o Crayons, stickers, scissors, labels kitted per lab, for decorating camper notebooks and lab displays for exhibition.
  o Jumpropes, balls, frisbees, sidewalk chalk for play breaks.
  o Friendship bracelet supplies

❖ Tool box
  o Box wrench for Lego tournament table assembly
  o Extension cords and power strips
  o Blue (7-day quick-release) masking tape
  o Duct tape for cord control

❖ Technical Mentor notebooks (we assembled 20 for 10 PAs; we handed out the extras to adult volunteers and parents who expressed an interest in coaching.) The distribution CD has all the necessary documents.

❖ Computer diagnostics: make sure that every computer has Robolab properly installed, determine which type of IR tower it needs on which port, make sure that Robolab can communicate with an RCX. If a computer has multiple accounts, make sure that someone knows which account and password to use (the registration box might be a good place to store this information).

❖ Lego Kit inventory: All kits should have a reasonable selection of Lego parts, sorted by part type. Fishing tackly boxes work well. See www.ortop.org for recommendations and organizational tips. Kit cleanup is an excellent activity for PA bonding, but should be considered separate from PA training. It takes someone familiar with the kits and their sorting system anywhere from 45 minutes to 2 hours to sort and inventory a kit, depending on the kit condition and what and where you are sorting. Carpet is better than a hard floor. Lots of little sorting bins – styro or plastic food trays or tubs – help a lot.

❖ Snack box
  o Candy for prizes in Icon bingo, documentation checks
  o Different, better candy and snacks to fuel the PAs (they will also often provide common treats).

LEGO ROBOTICS DAY CAMP

Logistics, Facilities & Personnel

❖ Notebook box to store camper notebooks overnight, and possibly Technical Mentor notebooks.

Camp Set-Up:

We were usually able to transport all materials in one large minivan and a station wagon, carefully packed.   First day setup took from 1 to 1.5 hours with 4 PAs and 2-3 adults all working.   On days 2 through 5, 20 to 30 minutes was usually adequate.

❖ Registration table near door; registration box. Notebook, tools, and craft box nearby.
❖ Lab tables with kit, power, computer, chairs.
❖ PA paradise with privacy screen, snacks.
❖ Circle Time area with whiteboard or easel, markers, handouts box.
❖ Tournament tables – one or two, with FLL mats and tabletop constructs and adequate traffic clearance on at least three sides. If possible, they should include lamp standards. (Plans are available on the FLL website).
❖ Central, controlled area with Technical Documentation box
❖ At each setup, verify that computers can bring up Robolab and communicate with an RCX (with better, more consistent equipment than we had, this step may not be necessary every morning).

Camp Nightly Closure:

❖ Powerdown & secure computers.
❖ Close & secure Lego kits.
❖ All partially constructed robots in suitable storage container, labelled.
❖ All confidential camper information secured.
❖ Camper notebooks in Notebook box until Day 5.
❖ All candy & snacks sealed.
❖ Common-use rooms may need reconfiguration.

The kits need to be re-inventoried and sorted after camp!