

Notes

- In general, teachers do not have much training in STEM/IT topics.
 - Do not make unreasonable expectations on the capability of the teachers.
 - The project must be designed for teachers with low STEM/IT skill levels. More complex activities could be available for teachers who are comfortable with more advanced capabilities.
- Making the project "teacher friendly" must be a primary objective of the project.
 - Videos, crib sheets, and web resources can help this aspect. Robokid 1 used all three (www.robokid.org.uk)
- Primary school teachers are busy people.
 - Requiring teachers to find additional resources to run the project will deter many teachers from adopting the project.
- The majority of schools do not have IT departments to install new software and solve networking issues. Private schools are the only schools where you can assume some access to IT infrastructure staff.
- School buildings vary in their ages. Some school buildings may be over 100 years old while some will be months old.
 - The project needs to be aware of this fact, e.g. the number of mains sockets in a classroom may vary significantly and affect the battery charging regime. Robokid 1 included a 6-way mains extension cable to cover this issue.
- Be aware of curriculum issues e.g. "Curriculum for excellence" in Scotland.
 - Robokid 1 used input from teachers in this respect. However, I think we could have done more in this area.
 - Head teachers have a wider remit with curriculum requirements. My experience is that they have to "tick" many boxes to meet general requirements. STEM is one of these boxes (and is an important one). Therefore it is not difficult to convince head teachers to accept a technology project, especially if there is zero cost.
 - One useful technique I used was to get an invite to "Cluster meetings". Each secondary school is fed by a set of primary schools. These primary schools meet on a regular basis at what is called a "cluster meeting". I got invited to a number of these meetings and was able to sign-up a number of schools (typically 4 to 6 schools) without having to visit each school individually. It also had the benefit that it informed the secondary school about what was happening in their associated primary schools.
- Charging for a project has a number of issues
 - a. What charge level should be set?
 - i. Too low and it costs more to collect than the revenue accrued. Too high and it will deter schools from adopting the project.

- b. The invoicing/collecting of fees can be onerous if there is not an existing mechanism to deal with the details. The university did not have this, therefore, this was one reason for going with a zero cost model.
 - c. One approach considered, but rejected, was to get companies to "sponsor" their local schools through donations. This would be financially simpler, but would involve considerable effort to sign-up companies and could lead to patchy adoption of the project.
- Delivery/collection
 - Effort is required to prepare the kits for delivery. The basic robot circuit board needs a quick test and the kit needs to be checked to ensure that all items are present and correct. Robokid 1 had three delivery and three collection periods per school year - delivery at the beginning of each term and collection at the end of each term. A technician was assigned to help with this process and we shared van driving duties.
 - Robokid 1 used a standard sized cardboard box to hold each robot kit and a standard heavy duty plastic box to hold a complete class kit that included all the robot kits. Therefore, a class kit was supplied in a single box.
 - A more recent discussion with individuals aware of package delivery and collection suggested that if sufficient volume can be achieved (could be quite modest) then courier delivery/collection could be cost effective.
- Project structure
 - A non-negotiable aspect of the Robokid 1 project was that it had to be a hands-on project. After discussion with teachers, a group size of 3 was adopted, which implied that the class kit needed a maximum of 11 robots (maximum class size in Scotland is 33) plus one for the teacher. The extra teacher kit was very helpful as it allowed the teacher to become familiar with the build. It also had a secondary purpose as a set of spares.
 - The robot kit was supplied in kit form and with the help of a video and a supplied screwdriver, the first activity was construction and test. I am an enthusiastic believer in hands-on activities in all areas of education. The group of three proved to be ideal for this activity. As an aside, it was left to the teacher to change the group size and to decide how best to run the project in the classroom.
 - Schools, who requested the project, submitted a form giving a preferred list of terms (winter, spring, and summer). I then organised a schedule and replied to the class teacher with their designated term. I'm sure some of this could be automated with the use of on-line booking sites. A very useful feature would have been an automated email to remind the teacher of the collection day.
 - I did not implement a policy of rejecting any schools. Although 95% of the schools were state schools, I did supply kits to a couple of private schools. Also, I supplied kits to a number of special needs schools.

- Overall the project structure worked well. I can only remember one instance where the kit box was returned unused and I had NO messages on the Robokid email address asking for help.
- Based on advice from teachers, I suggested that the project should be run over a six week period with one activity per week. In the most part, this was how it was done, but some schools did it in a short blitz format, possible as part of the schools science event. I was always happy to let the schools run the project in a manner that fitted their teaching objectives.
- As someone who had responsibility for outreach in the department, I was always concerned that one approach, giving guest lectures at schools, wasn't very effective since the impact of a 30/45 minute talk is debatable. In contrast, a project that lasts a number of weeks is, in my opinion, more likely to leave an impression on the pupils. The impression I wanted to leave was an interest in STEM.
- One of my overriding criteria in making decisions about the project was - "what would I have liked to do at that age?". I didn't want to do too much, just give the pupils something interesting to do.
- A second criteria was to make the project gender neutral. Although I included competitions in some activities, I did not go down the "Robot Wars" route.