

# FHSST HOW-TO\*

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## 1 How to collaboratively develop open-source textbooks (in hindsight!)

### 1.1 Prepared by: Mark Horner and Sarah Blyth

### 1.2 Date: April 2008

This document is complementary to the FHSST Case Study compiled by the Institute for the Study of Knowledge Management in Education (ISKME)<sup>1</sup> after extensive interviews with FHSST core team members and volunteers. The Case Study provides an excellent overview of the project. Therefore, rather than repeating work which has already been done, this document serves to try and distil the key learnings from the perspective of the FHSST core team members and volunteers and how we would (with the luxury of hindsight) go about setting up and running a project to produce open textbooks in a collaborative manner.

### 1.3 Quick Overview of FHSST

The Free High School Science Texts (FHSST) project was started in 2002 by postgraduate Physics students, Mark Horner and Sam Halliday, to produce a set of high school mathematics and physical science textbooks, free of author and publisher royalties, for grades 10-12 and which satisfied the South African new outcomes-based curriculum. The aim of the project was not to reinvent the way in which science and mathematics was taught at schools, but rather to address the huge shortage of accessible and affordable educational resources in South Africa. The vision of the founders was to write the textbooks in a collaborative way using contributions from many volunteers (similar to the way in which open source software is developed) which would also contributed to a more cost-effective product. Over the past six years the project has grown enormously in terms of volunteers and content produced. Currently, (as of April 2008) the books contain all the necessary content to satisfy the South African curriculum. In total we have collaboratively produced more than 1500 pages of content which have been edited by experienced educators who have all taught in South African high schools for a number of years as well as edited other textbooks previously. The books are now free to be downloaded (either as source copies or typeset pdf format) from the project website ([www.fhsst.org](http://www.fhsst.org)<sup>2</sup>) and future project goals include widescale printing and distribution of the books in hardcopy to schools across South Africa during 2008.

This project was started from scratch by a small core group of postgraduate university students and we have had to adapt our methods, processes, and approaches continuously throughout the life of the project in order to get to this point. Both the differing needs of the different project phases (i.e. raw content gathering/writing vs. editing) as well as unexpected hurdles have driven the need for us to evolve both

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<sup>†</sup><http://creativecommons.org/licenses/by/2.0/>

<sup>1</sup><http://www.iskme.org>

<sup>2</sup><http://www.fhsst.org/>

technologically and in terms of our content development methods. At the time we started, there was no other fully completed peer-produced textbook project whose methods and learnings we could follow and in hindsight there are many things we could have done differently to be more efficient and productive. But that's the beauty of hindsight, and so we hope that this document will help to provide other similar projects with useful insights and information to succeed! The document outlines the key areas we think are important to take into account when setting up and running an open collaborative project to produce content in a structured way.

Core Team:

Mark Horner, Sam Halliday, Sarah Blyth, Rory Adams, Spencer Wheaton

Book Coordinators:

Jaynie Padayachee, Joanne Boule

Editors:

Diana Mulcahy, Annette Nell, René Toerien, Don Whitfield

## 1.4 Get a core team

### 1.4.1 Consistency and similar goals

A small (5-10) core team of people who work well together and who share the same goals and ideals for the project is key to the success of the project. In FHSST, the basic core team of Mark Horner, Sam Halliday, Rory Adams, Sarah Blyth and Spencer Wheaton, has stayed consistent over the six years of the project's lifetime. This helps to ensure consistency in the project and that the main aims and goals are clear when/if new team members join. Also, it is logistically simpler to communicate within a small team and ensure availability of people at group meetings.

### 1.4.2 Clearly defined roles and multi-skilled team

To promote efficiency and allow people to take initiative in the core team it is important to have clearly defined roles. Within FHSST we mostly did not have clear roles and this sometimes led to certain team members taking on more tasks than was necessary which could have been avoided by better delegation of responsibilities. From our experiences, the roles we believe are required to make a successful core team are:

- team leader: This person needs to have the big picture of the project in mind to lead the others and keep the momentum of the project moving forward.
- treasurer: If funding has been donated to the project, it is important to have at least one person who keeps track of the project finances and communicates money matters to the rest of the team. It is a big advantage if the person also has an accounting background and/or knowledge of government tax requirements since by law it is required that non-profit organisations submit full financial statements at the end of each year. This is an area in which FHSST needed support which was difficult to find.
- spokesperson: In the event of press interviews or public statements, it is good to have at least one person who is prepared to promote the project in an enthusiastic way.
- proposal / document writer: Over the course of the FHSST project we needed to write a surprisingly large number of proposals and documents either for requesting funding, reporting to our donors or promoting the project in the press. We also sent out regular newsletters to our volunteers and interested parties. These are important tasks which can win and/or maintain funding and it is therefore important to have people on the team who write well and understand the project goals and philosophy.
- book coordinator/s: Book coordinators are a special role which we basically define as: "someone who, given enough time, could write the book themselves". It is very important to have a person who can guide the creation of a book, who has insight into the curriculum needs and can provide swift feedback on all aspects of the content and curriculum to volunteer contributors. It is very helpful both to the project credibility and for practical reasons for the person/people with this role to have teaching experience. We recommend one full-time coordinator per book since managing volunteers can be very time consuming.

- technical design / support person: It is vital to have a technologically competent member of the core team who can maintain the project website and design and implement necessary improvements to the site with a fast turnaround time. During the course of FHSST we had 5 iterations on our website from being just an information site to building up to a full content management system. Without the technical insight and ability within our core team, we would not have been able to adapt as quickly to technological needs of the project. In addition, we did not have to spend funding on technical tasks since this was performed on a volunteer basis. FHSST would have benefited from more capacity in this area since it became a large part of the project.
- recruiter: This role is vital in order to recruit volunteers (the core contributors) to the project. Everyone on the core team should try to perform this role to gain as many volunteers as possible. There were times on our project when the priority of recruiting slipped and core team members were required to do more content creation work than originally envisaged in order to meet funding requirements. Our key learning from that experience is that recruiting should always be a top priority of the core team.
- organiser: Having someone on the team who is a good organiser is very useful since things always arise which need to be done and for which details and planning are important. In our case we had a number of subprojects, most notably our classroom content trials which required liaising with a number of different schools and organising school visits and distribution and completion of surveys as just one example. The trials alone required a person to work full-time for 2 months on this area.

One person can take on more than one role and more than one person can fulfil a particular role depending on the situation. However, it's important to communicate who is responsible for what. Also, this requires a team with people who are multi-skilled. In our case, most of us could programme, all of us were qualified from our studies to be able to write content etc. We also found that the core team needs to be flexible in their responsibilities since the needs of content creation projects change over time from content gathering, to content editing, and finally to the printing and distribution phases. This requires open and regular communication.

#### **1.4.3 Regular and open communication**

The importance of open and regular communication between team members cannot be stressed strongly enough. During the main content creation phase of the project we held weekly meetings between the team members involved in that area which were particularly important since the team was geographically divided between continents. We held our conference calls using Skype to cut telephone costs. These meetings were always run with an agenda and included feedback sessions as well as team brainstorming sessions. Minutes were taken and used to inform the following meeting and help with project tracking. However, when regular meetings and communication stopped at one stage, due to various team members having other priorities, a valuable contributor to the project decided to leave. Better and more regular communication would most likely have allowed the team to avoid getting to that stage and would ultimately have required less time as they needed to be replaced which took a large amount of time.

#### **1.4.4 Integrate new members fully**

New members to the core team need to be integrated properly to be most effective and productive. We found that it is very important to communicate the project history and goals upfront to new team members and to support them in new roles for some time before completely handing over responsibilities. It has to be remembered that for new team members coming on to the project need some time to assimilate the way things are done within the team and find their comfort zone. It is important to support new members and to have open and regular communication to iron out issues quickly.

## 1.5 Select a Licence

In an open content project one of the first things to decide upon is a copyright licence under which material will be produced. In the case of FHSST, we chose the documentation licence released by the Free Software Foundation (FSF): the GNU Free Documentation Licence (GFDL)<sup>3</sup>. The reasons for this were that at the time the software equivalent, the GNU Public Licence (GPL), had significant traction and there were no well known alternatives. In addition, it allowed us to take advantage of the free web-hosting on the FSF servers<sup>4</sup>. Creative Commons (CC)<sup>5</sup> licences are now well known but were not available at the time we started the project.

The spirit of the GFDL allows for works to be copied, distributed and modified so long as credit is given to the original document (by-attribution) and derivatives are released with the same freedoms (share-alike). The GFDL has some subtle special clauses without which it would be, for all intents and purposes, the same as the CC by-attribution, share-alike licence.

The FHSST core team feel that the attribution clause ensures that people get due credit for their work and that the share-alike clause ensures that content will seed material from which they can further benefit and precludes profiteering.

Choosing a licence for a new project depends very much on the outlook of the core team and can be quite a contentious issue at times. It is important to consider possible licences, checking what is applicable in your country. A good resource for this is the CC website. Be sure to consider the following points:

- whether you/your authors want to be credited
- whether you want derivative works to be allowed
- should derivative works be open or not
- whether other organisations with a commercial interest can attempt to add value

Decide before starting content development which licence to use because changing a licence is difficult and, unless all authors cede copyright ownership to the project, will require getting all contributors to agree to the change.

## 1.6 Design and set up a content development platform

Collaboratively developing material online will, of course, require that you provide a website which will become the hub for the project. There are a few things to bear in mind when choosing the underlying platform and beginning development.

### 1.6.1 Support automated workflow

It is important to understand the workflow associated with material. Opening the site up for anyone to contribute means that you will get random contributions which may or may not be in-line with the objectives of the project. You should allow anyone to participate and contribute but have a means for checking that those contributions are meaningful. You will also need to provide feedback on what was or was not appropriate about the material. The platform should allow you to automate as many management processes as possible.

FHSST identified the need to automate processes since coordinators were spending most of their time in back and forth email exchanges just to identify possible assignments for new volunteers. The automated processes removed this workload entirely and gave volunteers more independence in choosing their assignments.

It also allowed automation of management emails and ensuring that the correct people were automatically notified when a volunteer required feedback without the volunteer having to directly contact a particular

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<sup>3</sup><http://www.gnu.org/copyleft/fdl.html>

<sup>4</sup><http://savannah.gnu.org>

<sup>5</sup><http://www.creativecommons.org>

person. This gave the team freedom to change reviewers without having to notify all volunteers and reduced the need for coordinators to send personal emails.

### 1.6.2 Provide structured framework for content

A book is not a loosely connected set of pages (think wiki) but a structured document with consistent structure and coherent flow and style. It is best to incorporate as much of the final structure into your online development as possible so that everyone knows what is expected and how it will all fit together. The structure should allow for the objectives (syllabus) to be displayed as part of the structure and allow for the relevant material to be written. Deciding how you want to approach this is important. We found that insufficient clarity and curriculum information about section requirements slowed down the content creation process because of the detailed communication required and the reliance on volunteer coordinators having time to respond.

### 1.6.3 Choose and build a platform (CMS vs. Wiki)

Once you have decided on how you want to structure your books and manage the contributions, a platform needs to be chosen. We advocate using a content management system (CMS) because it includes authoring tools, provides workflow functionality, many community-related tools and acts as a repository for content.

A wiki solution is also a natural first thought and early in the project, FHSST ported two books to Wikibooks in an attempt to leverage off their community and infrastructure. However, we found that a wiki is not suitable for a number of reasons:

- there were no tools for managing the quality of contributions nor their alignment with the objectives of the project (specifically, we received contributions that were well-intentioned but at odds with the SA curriculum from a number of contributors and our entire administrative effort became devoted to reverting these edits and appealing to people to understand that we were focussed on a specific curriculum even if it seemed deficient to them)
- volunteers were uncomfortable with having their works-in-progress allowed to be edited by anyone while they were still writing it themselves. Volunteers prefer to take ownership of a section and feel more confident receiving feedback once it is complete.
- allowing editing by anyone also reduces coherence and focus
- there no tools for developing a community around a book, for example discussions forums, assignment monitoring, mailing lists or even identification of authors. There was no way to communicate with people working on the books.
- the particular wiki community was actually very small and there was no means for initiating contact with contributors on any meaningful scale
- it lacked proper typesetting functionality to produce high-quality hardcopy (which was the final objective of FHSST)

It is possible to add workflow and other functionality to a wiki-based platform but then, for all intents and purposes, it becomes a fully-fledged CMS!

### 1.6.4 Lower the barrier to contributing

During the very early stages of FHSST when we were using only the tools that were most familiar to the physics graduate students in the core team (CVS<sup>6</sup>, LaTeX<sup>7</sup>) we discovered that, despite our best efforts to train and support volunteers, the technical barrier to contributing proved a massive challenge and inhibited the project significantly. It is imperative to set the technical barrier-to-entry as low as possible. FHSST lost a number of potential volunteers through people not being able to configure their software appropriately or

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<sup>6</sup>Concurrent Versioning System

<sup>7</sup>A free, scientific typesetting language particularly adept at displaying mathematical expressions

being intimidated to use LaTeX. It is also important to remember that you need to meet goals surrounding layout and typesetting of the final book which were well met by using LaTeX but also proved to be the major barrier to entry for the majority of volunteers.

If the final product, i.e. a book, looks inferior it will be judged as inferior. If the project is to write a book that includes equations and graphs then it is even more challenging to ensure a quality finished product. Two web-frameworks which require the volunteers to only have internet access to contribute which are worth considering for producing a printed book are:

- Drupal ([www.drupal.org](http://www.drupal.org)), as it now supports the inclusion of mathematical equations and can be styled to be printer-friendly. This is what FHSST used but we used the book module to structure a set of LaTeX pages and then ran the LaTeX on the server. This meant that volunteers didn't need to install LaTeX.
- Connexions ([www.connexions.org](http://www.connexions.org)<sup>8</sup>), which is available as a platform called Rhaptos and uses XML for storing content but converts to LaTeX for pdf-file creation on the server so that it is properly typeset.

We encourage the use of open-source software projects like these two and suggest, if possible, partnering with existing initiatives to strengthen projects that already exist.

### 1.7 Recruit Volunteers

In an environment of open peer-production or collaborative content creation it is imperative to recruit reliable volunteers who regularly contribute for the project to be sustainable. FHSST recruiting efforts included:

- Active recruiting:
  - word-of-mouth recruiting:
    - \* regular recruits doing recruiting (cascade effect)
    - \* stalls and presentations at universities and science festivals
  - advertising of the project on Yahoo and Google groups targeting people with interests in chemistry, physics and mathematics
  - emails to friends
- Passive recruiting:
  - advertising for volunteers through the project website

We found that the most successful method of recruiting reliable, regular volunteers was by word-of-mouth. We believe the reasons for this include the fact that word-of-mouth recruiting was, by its nature, biased towards people who would be more likely to join the project due to common interests or skills, and also the fact that having a conversation with a potential recruit gives them the opportunity to ask questions and gain more insights into the project than is possible by reading an email or checking the website online. We were very successful in recruiting small clusters of volunteers in different countries and cities through having enthusiastic people with a close ties to the project distributed in different locations and who promoted the project to their friends / peers / colleagues. It was also important to stress to volunteers that they were encouraged to recruit people themselves to join the project.

When recruiting potential volunteers we found it is also useful to promote the need for the project and why one personally is part of it. Everyone joins for their own reasons and so it is not always constructive to tell a person why they 'should' join but rather why one is part of the project oneself. Also, it can be helpful when recruiting students to point out that the project is a community project and can be an important addition to their CV.

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<sup>8</sup><http://www.connexions.org/>

### 1.7.1 Target groups

To get the best 'return on investment' in terms of effort spent recruiting and number of volunteers recruited, a project needs to identify target groups for recruitment. FHSST had a lot of success with recruiting university students (mainly postgraduates) because this was the peer group of most of the core team and therefore accessible to recruit through word-of-mouth and also because students typically have more flexible schedules within which to include volunteer activities. Further, the students we recruited typically had similar skills to the core team and were familiar with the technology used to write content and so the barrier to entry for this group was low. In addition, these students had expertise in one of our book subject areas.

Scientists and university staff were also recruited to contribute, mainly, but certainly not always, through personal relationships with various university or laboratory departments.

Teachers were another large target group we focussed on recruiting and the project core team grew to include a teacher. In addition we recruited four further very experienced teachers to perform final editing of the content to ensure that the content applied properly to the curriculum and was useful from the point of view of people with experience in the classroom. We found that at first teachers were very sceptical about the project's prospects but as the body of content produced grew it added to our credibility.

We did attempt to recruit contributions from people in business and industry but were largely unsuccessful in this area mostly likely due to the time constraints on these people from their work. Our attempts here were modest but we believe that engaging management in large organisations in related areas could prove beneficial for future projects.

## 1.8 Keeping Volunteers (especially the good ones!)

To maintain a good relationship with volunteers it is important for the core team to treat them with respect and to remember that volunteers are doing you a favour. It can be frustrating when volunteers do not deliver content in a timely fashion, but this is part of being in a volunteer organisation and is why good communication with volunteers to keep them motivated and interested in the project is vital to maintaining the pace of content creation. It is also important to reassure volunteers and give them guidance during the content creation process. And most importantly, it is important to thank people for their contributions. It is very important never to let frustrations with volunteers who are not delivering affect the treatment of those volunteers or volunteers who are delivering.

### 1.8.1 Communicate regularly

When a project has a large pool of volunteers, particularly when they are geographically dispersed, regular communication is an important tool to use to inform people of the latest project developments, plans and achievements. We also believe it is important to keep the communication of project strategies open to the larger volunteer base and we regularly shared our proposals and ideas with our pool of volunteers. We also asked for input on various issues from volunteers. Volunteer feedback was typically quite rare, however, we received feedback that they appreciated the inclusion.

There are various methods of communicating which can be used to fulfil various functions and which we found to be successful:

- Send out regular newsletters: We wrote monthly update newsletters explaining what the project had achieved in a given month and what the plans for the next month were to keep volunteers and other interested parties in the loop. According to the results of the volunteer survey we did with ISKME, these newsletters were valued by volunteers and being late or not sending them out did not reflect well on the project.
- Keep the project website up to date and current: This shows potential volunteers coming to the website for the first time that the project is current and that things are happening and ongoing. It was our aim to upload education-related news stories, or updates on project events on a regular basis to maintain a current look to the site. We did not always live up to this aim, but we did try! Our wishlist of future updates and suggestions for other projects of ways to keep their websites current include:

- links to regularly updated or changing statistics (e.g. number of people signed up over the previous month, number of pages of content uploaded)
  - project progress charts – preferably automated and linked the project database to minimise the amount of time the core team needs to spend on updating the website
- Open, forum-based communication of project-related issues: It is very useful to set up a forum-type communication channel for questions/discussions related directly to certain aspects of the project which more than one volunteer is likely to be interested in. In this way, more than two people can easily join in the discussion and provide help. Also, it can help to build a sense of community and encourage volunteers to help each other rather than it always being dependent on the core team to respond to trouble-shooting requests. Another advantage is that it allows core team members to monitor interactions between volunteers and step in if necessary to stop 'bad behaviour'. As the core team, we learnt the importance of this method of communication early in the project when a volunteer (not a member of the core team) offered to help another volunteer with a software issue. The discussion went offline and became private between the two parties and suddenly resurfaced when the volunteer asking for help was already angry and leaving the project because of rude treatment by the other volunteer. In this way we lost a potentially very valuable volunteer and it could all have been avoided if the communication had been kept open and public and the core team given an opportunity to step in when things got out of hand. Ultimately the rude volunteer had to be asked to leave the project after repeated incidents of bad behaviour. New projects should be aware that this is a very real possibility and not all volunteers are helpful.

### 1.8.2 Hackathons

Holding regular hackathons was a way to facilitate a large volume of content to be created / edited in a very short space of time as well as a way of promoting a sense of team spirit and fun among volunteers. Our FHSST hackathons consisted of getting together a group of volunteers, sitting in the same physical location (either a coffee shop with wireless internet access or a university computer lab) and working on developing or editing content. We found this was a great way to create a face-to-face community within the project and also provided people with a set time per week/month to dedicate to the project where they felt motivated by the enthusiasm of the other volunteers to contribute.

To promote the aspect of fun, thank our volunteers for their contributions, and increase the length of time people would want to stay at hackathons, we also provided free pizza which was a big success – particularly for motivating university students! Also, having an interval in the middle of a hackathon for volunteers to socialise and meet each other added to the team atmosphere.

We also found that holding hackathons and reporting back on them on the website (including photos of pizza-eating volunteers) led to volunteers in other places holding their own hackathons. In this way we had a group of engineers from industry set up and hold their own hackathon to create FHSST content!

For a detailed how-to on holding hackathons please consult the ISKME Hackathon How-To.

## 1.9 Create Content

### 1.9.1 Guide volunteers and adhere to the curriculum

A curriculum-aligned book structure which contains the syllabus requirements is necessary to guide volunteers regarding what they should write as well as ensure that the project stays focussed and on-track, or at least provides a well-defined measure for how off-track it is. FHSST used Drupal's book module with each chapter being a new node in the book hierarchy and also added a new field to each node which contained the curriculum syllabus and outcomes. These were only editable by the coordinator for each specific book.

### 1.9.2 Appoint book coordinators

The book coordinator must be the person who configures, manages and modifies the overall structure. The FHSST rule-of-thumb for a coordinator is “someone who could write the entire book themselves if they had the time”. FHSST coordinators were required to set up the book structure and fill in the curriculum details.

Coordinators are vital in the workflow process to respond to queries, provide feedback to volunteers during the writing process, evaluate all submitted content and edit content .

### 1.9.3 Make deliverables manageable

Breaking the book structure into small, well-defined assignments allows users to browse and select a small section as an assignment. This significantly

- reduces administrative workload
- improves manageability of users assignments
- increases likelihood of volunteers completing assignments

In the case of FHSST, we found that collaborative development of individual assignments did not work and volunteers wanted exclusive editing rights and their assignment to be reviewed only when they felt it was ready. Initially we asked people to write chapters as assignments but found that this was intimidating to volunteers and often we did not receive anything from them at all. Breaking assignments down into smaller chunks resulted in better returns.

### 1.9.4 Automate assignment selection

We found that the the administrative load of assigning initial work to volunteers could become quite significant, especially in periods where recruiting had been done which resulted in a significant volunteer increase for a specific book. By having a book framework with distinct units which could be listed as assignments, volunteers could browse available sections and select their own assignments. Once selected, the assignment would be removed from the assignment list so that only one person could work on it at a time. Volunteers were only allowed one assignment at first. Once this first assignment had been reviewed they could then have multiple assignments allocated to them. This was a means to assess the commitment and quality of the volunteer and ensure that volunteers who could not deliver were not able to “squat” on many assignments. Users could also relinquish assignments of their own accord, though this happened rarely.

### 1.9.5 Build tools for managing assignments

We tried to build management dashboards (management overview page) on a book-by-book basis which showed which assignments had been dormant for long periods of time. We colour coded dormancy periods (green, yellow, red) which were configurable on a book-by-book basis (default settings were 21, 35, 42 days respectively). The tools then allowed bulk relinquishing of assignments through automated notification emails. This would put long-dormant assignments back into the pool to be chosen by other volunteers.

### 1.9.6 Make web-based authoring central

Ensuring that content development, with revision control, takes place on your website means that all contributions are effectively collected even if they are not completed assignments. In the early days of FHSST, before online authoring, volunteers would claim to have worked on, typically large, sections but not complete them. These partially complete sections were never sent in, what communication did take place indicated that the primary concern on the part of the volunteer was that the section was not complete. By working online all contributions can be captured. It also means that the entire project can be backed up from a central location.

### 1.9.7 Automate content workflow (find the diamonds-in-the-rough!)

If a project is very successful then the book coordinator should not be able to cope with reviewing all contributions. We implemented automated workflow to manage content quality:

- content development / writing (content owned by author)
- review and feedback by coordinators (content frozen)
- possible further revisions (content owned by author)
- final submission (content owned by coordinator)

We also used our workflow to help with the identification of special volunteers by reviewing a number of contributions from a volunteer. This allowed us to assess whether or not they understood the project, curriculum, language and style objectives sufficiently well to provide other volunteers with feedback. Volunteers who we felt met these criteria were promoted to an intermediate role (editor) between volunteer and coordinator. They were allowed to provide feedback to other volunteers. If they excelled at this they could eventually become a coordinator for the book.

By providing a metric for the review of submitted assignments an automated process of identifying special volunteers can be implemented. When we implemented our full CMS, we were already in the editing phase for the FHSST books so we were not able to implement this aspect fully but given our experience we felt the following to be a first set of metrics:

- number of contributions – identifies how much time a volunteer has for the project
- complexity of language – shows an understanding of the target audience
- complexity of reference content – shows an understanding of the curriculum
- complexity of exercise/activities – shows an understanding of an assessment

A user had to submit at least 5 assignments and have an average rating of >3.5 on a scale of 1 to 5 for the complexity ratings. It also allows for the training of users with a clear acknowledgement of achievement.

### 1.9.8 Hold Hackathons

Hackathons, as defined earlier, are great events for content development which result in significant content generation in a relatively short period of time. There are some important content-related things to consider when holding hackathons which help to significantly improve their success. Hackathons should:

- be as organised as possible
- have clear, very short assignments achievable in 2 hours
- expect a volunteer learning curve and allow for web-system training – sometimes only the 3rd hackathon is very productive for an individual volunteer
- include core team members / experienced volunteers to run them and do volunteer support
- include social time so people have an opportunity to meet other project members

We also found that providing a progress report of the project at hackathons was well-received. Another volunteer favourite was when we provided pizza.

### 1.9.9 Competitions

FHSST attempted to run competitions as an additional method to gather content and essays. Unfortunately, the competitions were relatively unsuccessful. In reviewing the competitions and considering current competitions in South Africa we attribute the failure to lack of effective advertising and a high barrier to entry.

It is prohibitively expensive to advertise on a large scale unless a project partners with a media-related partner or has significant public presence. Most current competitions have significant repeated exposure on

TV and radio as well as a large prize. In contrast, FHSST was only able to afford to place a small number of print advertisements in a newspaper or a magazine for teachers as well as advertising on the Science in Africa online magazine. These adverts were possibly not targeted ideally and definitely not seen often enough by possible entrants. However, advertising was limited by our budget.

In most competitions, very little is required for entry; the barrier to entry is extremely low. For FHSST competitions, contestants were required to generate new content, a significant effort relative to other competitions, despite comparable prizes. We believe that this was directly responsible for our low entry rate.

In future, we think competitions could still work if significant exposure can be generated and the target audience is able to enter with minimal effort. For example, a significant advertising campaign for a competition with a cash prize, where teachers contribute an activity or exercise they have already constructed may be the best structure.

Another way to generate interest amongst contestants may be for the prize to become a status symbol. This could be possible if the content development project becomes widely known and respected and has significant enough impact to be viewed favourably amongst the target group.

A project developing material for a more general audience might try to get their competition listed on a news website like Digg or Slashdot which would result in significant exposure as well.

## **1.10 Test content**

No matter how closely you stick to the curriculum documents or how well you manage volunteers, the real test comes when content is used in the classroom. FHSST conducted classroom trials of material in all subjects in grades 10 and 11 for 1 month in 2007, in order to get feedback to improve on our books and to ensure that the primary stakeholders, the teachers and learners, were satisfied.

### **1.10.1 Prepare a reference**

In preparation for the tests we constructed our baseline questionnaires to assess what teachers and learners did and didn't like about textbooks, what they thought could be improved, as well as what their favourite textbooks were and why. This was done to ensure that feedback on FHSST material was consistent and final results could be cross-checked. We were concerned that exposure to the FHSST material would in some way bias the results.

### **1.10.2 Testing the material**

Content was delivered to 10 schools to use for 1 month. FHSST was not able to dictate how the material was to be used in the classroom and most teachers used the material in addition to their current primary resources. At the end of the month all teachers and learners completed questionnaires relating specifically to the FHSST material.

### **1.10.3 Reviewing (include your stakeholders)**

We collated the final results and cross-referenced them with the initial results. These were then presented to the participating teachers at a workshop we organised. This helped us to clarify any unclear answers and include the teachers in discussions around improvements. We received a lot of positive feedback from teachers, specifically about being included in the final workshop.

Ultimately the results from the trial feedback were fed into the final editing process which only started after the trials were completed.