
History of High School Enterprise:

- Michigan Tech’s Enterprise Program
  - National Science Foundation (NSF) funded Enterprise in 2000
  - MTU graduation rates = higher for Enterprise students
- 2004 Cherry Commission
  - Lt. Governor Cherry’s report
  - Challenged us to double the college graduates in Michigan
  - Encouraged university, industry, and K-12 community partnerships
- 2006 Mroz Commission
  - Community partnership with CCISD, Michigan Tech, Smart Zone and others
  - Challenged the partners to create a K-12 program built on the success of Michigan Tech’s Enterprise program
- National Science Foundation IEECI* award in 2008
  - 5 teams of HSE students.
- National Science Foundation ITEST* Award in 2009
  - Three year program 2009-2012
  - 8 Schools

1. What is HSE?

High School Enterprise (HSE) is an extra- or in-curricular school program in which students from grades 9-12 engage in active, applied STEM learning. Students participate on teams organized as “virtual companies” that develop products or services as they engage in long-term projects with a STEM focus. HSE team projects are STEM-based but can involve students from
all backgrounds and with a variety of interests. Students do not need have to have previous credentials (e.g., completed algebra) in order to contribute to the team in a significant way. HSE teams are coached by specially-trained high school STEM faculty called “teacher-coaches.” Teams have access to real-world expertise and mentoring from professionals in academia and industry.

HSE is modeled after Michigan Technological University’s highly successful and nationally acclaimed undergraduate Enterprise program. The Enterprise program was founded on the proposition that the integration of active, applied learning into the undergraduate engineering curriculum would result in greater retention and graduation rates among undergraduate engineering students. Enterprise, which started in 2000 as a pilot program funded by NSF, has succeeded beyond expectations and has proved to be a sound investment. It is now a self-sustaining program that attracts engineering and other STEM-bound students to the University, keeps them, and makes them more marketable to employers when they graduate.

HSE teams write business plans, solve real-world problems, perform testing and analyses, build prototypes, manufacture parts, operate within budgets, and manage their projects. Each spring, HSE teams showcase their work alongside college students at the University’s Undergraduate Expo. At the conclusion of their HSE experiences, it is expected that the students will demonstrate proficiency in applied workforce skills, they will be more disposed to enter STEM careers, and they will be prepared to undertake the training and education needed to enter those careers.

2. What is an HSE team?
An HSE team is comprised of high school students (grades 9-12). These teams are led by a teacher/coach, and typically partner with university students and industry mentors who help develop technical, business, interpersonal, entrepreneurial, and applied workforce skills.

High School Enterprise teams members work together and learn how to—

- Communicate
- Set project goals
- Schedule and manage projects
- Make decisions
- Work together in teams
- Meet people from industry
- Understand engineering and business ethics
- Develop entrepreneurial skills

HSE Team Model (shown in the diagram below):
- Participate in virtual companies where they create products or provide community services. Each year, they receive funding for supplies, which enables them to manage long-term projects from inception to completion.
· Coached by specially-trained high school teachers (a.k.a., “teacher coaches”) who receive stipend per year.
· Make formal presentations at undergraduate research expositions (e.g., Michigan Tech’s Undergraduate Expo), and conduct project-based interactive sessions at middle and elementary schools within their local school districts.
· Operate under the umbrella of a partnership that includes the team’s home high school, a university/community college partner, student professional society groups, industry and community sponsors and advisors, and academic booster clubs.
3. **What is an ideal team size?**
Typically, there are about 12-20 students on one team. Once the project gets going and the team takes on more projects, the team size can then grow/expand.

4. **What are some potential roles and responsibilities of team members?**
   - Research
   - Building
   - Project management
   - Quality control
   - Marketing/communication
   - Web coordinator
   - Documentation
   - Fundraiser
   - Team spirit

   *possibly add a link to other docs discussing what is done by each of these and how to assign roles*

5. **What does a teacher-coach do?**
Teachers are paid to “coach” student teams in the planning and completion of one or multiple long-term, STEM-based projects. These teachers will be identified as teacher-coaches in this program. HSE teams may meet after school or on weekends (as athletic teams do), or possibly during the regular school day.

   **Specific expectations for teacher-coaches:**
   - Regularly attend on-line meetings as scheduled by the program manager for their team. These will take place about every other week, or every three weeks depending on the time of year. If a meeting must be missed, it is expected that the Teacher-Coach will inform their program manager and see to it that they inform themselves on the missed meeting content.
   - Attend the summer workshop (see question #9) and/or other HSE professional development opportunities. To be an HSE Teacher-Coach, it is a requirement that one summer workshop be attended within one year of starting the team. Attendance at subsequent summer workshops may be dependent on funding sources (e.g., a grant may require that teachers attend each summer that the grant is funding the team).

6. **What does the team do during meetings?**
The teams will typically meet 2 times per week for 1-3 hours. During this time, the team will:
   - Develop an idea for a project (e.g., students brainstorm, teacher presents alternatives, project ideas may come from outside sources; such as a local company)
   - Define the project scope, outcomes, timetable, and budget; as well as examine personnel, equipment, and facility issues
· Present a proposal to a committee made up of representatives from Michigan Tech and other organizations by mid to late-September for review and budget authorization.
· Work on the project, using ties to Michigan Tech (or other universities), the community, and industry.
· Prepare presentations on the year’s work for the Michigan Tech Enterprise Expo in April (or a similar event at another university) and for other occasions such as competitions, school board meetings and the like.

Go to: [http://www.enterprise.mtu.edu/highschool/coaches/index.html](http://www.enterprise.mtu.edu/highschool/coaches/index.html) to see a time line for a typical HSE year.

7. **What is the Michigan Tech Enterprise EXPO?**
The link to the university or community college is very important in making a seamless connection between the HSE student participants and their pathway to post-secondary education. To strengthen this link, the HSE program holds a year-end culminating Expo where teams showcase their project work at a university or community college campus. The EXPO is held at the Michigan Tech campus in April, where student teams from Enterprise (including High School Enterprise), Senior Design and Undergraduate Research programs at Michigan Tech display their projects to industry guests, project sponsors and partners, the local community, Michigan Tech faculty, staff and students.

8. **What are some of the potential project ideas?**
All HSE projects are STEM-based. Go to the HSE Web site ([http://www.highschoolenterprise.org](http://www.highschoolenterprise.org)) to learn more about current projects. These projects are usually long term (at least one school year if not longer).

9. **What is the summer workshop?**
The summer workshop is organized by the HSE program personnel and is usually held between June and August at the Michigan Tech campus, where current and potential HSE teacher-coaches meet and receive training and support. The goals of the workshop are as follows:

· Give new and returning teacher-coaches a face-to-face explanation of the program and its goals, especially the ITEST study, which officially begins with this workshop.
· Provide participants with the opportunity of discussing the HSE program and building camaraderie among the group. This workshop is one of the few opportunities where HSE teacher-coaches can meet face-to-face to share experiences, both good and challenging, to build relationships that will facilitate communication with one-another during the school year, and to add each other as support resources.
· Develop plans for program improvement through formal group discussion about the parts of the program that worked well, and those that needed improvement.
· Educate participants through several topic sessions by presenters from various fields to help them coach their teams.
· Motivate participants to continue coaching HSE teams and to foster the program within their schools.

Go to: [http://www.highschoolenterprise.org/](http://www.highschoolenterprise.org/) to see summer workshop activities in previous years.

10. **What is the Summer Youth Program (SYP)?**
Michigan Tech's Summer Youth Programs (SYP) offers over 70 explorations each summer to discover and learn about various fields through hands-on laboratory, classroom and field experiences for high school students. Sometimes, funding is available for HSE students who are interested in attending SYP.

11. **Why are the teams assessed?**
The teams need to be assessed for two main reasons:
· The team need to know how they are doing in meeting their goals
· The assessment helps continually improve the HSE program

12. **What about funding?**
Schools selected to participate in the initiative will receive funds to pay a stipend to the teacher-coach of the HSE team. The teams will also receive funds to pay for the cost of their project, training for the teacher-coach, and travel expenses to the Enterprise Expo at Michigan Tech in April.

13. **What about other funding models?**

*Corporate Founder:* There will be opportunities when the interests and needs of a large corporate benefactor will align almost perfectly with those of a school and its HSE team(s). The mutual interests will be strong enough that the corporate founder will chose to endow an HSE program, ensuring sustained support for the program.

*Corporate Sustaining Partner:* This model is most appropriate in larger, urban school communities where the likelihood of a large, financially sound partner with a strong community presence is greater. A corporate sustaining partner will commit to fully fund one or more HSE teams for multiple years.

*Regional Corporate Partners:* Smaller corporate partners who are willing to join with other regional companies can support one or more HSE teams from high schools in their communities. These companies would commit to help support an HSE team on an annual or multiple-year basis.

*Small Business and Academic Booster Club Model:* This funding model would serve smaller communities where there are not sufficiently sized corporate partners to unilaterally sustain HSE teams. In this model, small businesses, philanthropic citizens, and community organizations such as academic booster clubs will work together.

14. **What are some fundraising ideas?**
Booster club – identify a person in the team to be a head fundraiser
· Sample letters for potential sponsors and donors
15. **Who are the mentors?**
Mentors are people who work with the team in their area of expertise and serve as resources. Possible mentor types include (but are not limited to) engineers, high school teachers, science professionals, graphic designers, programmers, and marketing experts.

16. **What does a university partner do?**
Teacher-coaches are supported by HSE program personnel, who are often based at a university or community college. The program personnel hold meetings, organize the summer workshop, provide other professional development resources, and coordinate the EXPO activities. Since HSE teams need further support from both industry and local communities in the form of mentoring, fundraising, and general public support, the HSE program personnel are there to help build a funding mechanism that fits each school.

17. **Checklists and schedules**

<table>
<thead>
<tr>
<th>Month</th>
<th>Team activities</th>
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<tbody>
<tr>
<td>September</td>
<td>get a group of students together to form a team</td>
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<tr>
<td></td>
<td>develop a project or project theme (e.g. green school, mechatronics)</td>
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<td></td>
<td>develop a team identity; &quot;company&quot; name, logo and mission statement (see Current Teams)</td>
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<tr>
<td></td>
<td>note: marketing your team will be an ongoing task from this point on, perhaps a sub-team can be dedicated to this aspect of the team.</td>
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<tr>
<td></td>
<td>distribute and collect media waiver forms</td>
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<tr>
<td></td>
<td>begin working with SAMPI on program assessment according to the evaluation guidelines: distribute evaluation surveys to students to obtain their parents' signatures; collect and return the surveys to SAMPI</td>
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<tr>
<td></td>
<td>complete pre-program surveys (for coaches)</td>
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<tr>
<td></td>
<td>participate in Adobe Connect Pro meetings (ongoing activity for coaches)</td>
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<tr>
<td>October</td>
<td>decide on project, goals and outcomes</td>
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<tr>
<td></td>
<td>develop a project timeline for this year (and beyond, in some cases)</td>
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<tr>
<td></td>
<td>develop a project budget (by using the budget template)</td>
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<tr>
<td></td>
<td>start project work, ordering, design, prototyping, tracking and communicating progress</td>
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<tr>
<td></td>
<td>document project/team work with pictures, videos, written documents, etc.</td>
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<tr>
<td></td>
<td>note: e-mail bi-monthly Web updates to Web coordinator</td>
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<tr>
<td>November</td>
<td>continue with project work and documentation</td>
</tr>
<tr>
<td>December</td>
<td>re-examine project goals &amp; milestone before semester break, re-define if needed</td>
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<tr>
<td></td>
<td>start preparing mid-year summary report</td>
</tr>
<tr>
<td>January</td>
<td>submit mid-year summary report</td>
</tr>
<tr>
<td></td>
<td>continue with project work and documentation</td>
</tr>
</tbody>
</table>
February · continue with project work and documentation
March · continue with project work and documentation
April · complete travel arrangements for Expo (permission slips, lodging, travel, etc.) with assistance from MTU HSE program
· prepare display and presentations for Expo
May · continue project work, lay plans for end of year and continuation for next year
· develop presentations for community groups - middle and elementary schools, service clubs, board of education, booster clubs, industry audiences
· give presentations to community groups
· Complete post-program assessment via SAMPI
· start preparing YES (Year End Synopsis) report
June · make summer plans for the team
· put plan in place to start in SEP
· submit YES (Year End Synopsis) report
June/July/ · carry out summer HSE team plans
Aug · attend summer workshop (for coaches)