

**Summary:** Engaging students in research involves bringing in and developing students by being part of real research. Students can be part of the research process in many ways and for different purposes ranging from helping students understand and develop inquire based/critical thinking mentalities to helping university professors solve real-world problems. Having students involved in research allows them to have a real experience as they go through hands-on training in developing usable cognitive and procedural skills.

Angela Brew and David Boud, noted university professors and researchers, in linking the importance of teaching, research, and learning, described this vital correlation by stating that research is, in itself, the process of learning, regardless of the academic field (Brew & Boud, 1995). As such, the process of effective scientific research should be incorporated into the overall educational process.

**Benefits:** A multiple of wide-ranging benefits have been identified and verified by various researchers across academic fields (Eagan, 2011; Edwards et al., 2007; Hunter et al., 2006; Jackson & Moore, 2012; Laursen et al., 2010; Osborn & Karukstis, 2009; Seymour et al. 2004):

- growth in intellect/cognitive abilities
- increased creativity & motivation (relevancy)
- heightened communication skills
- improved student marketability
- development of technical skills
- enhanced confidence and capabilities in career
- improved capability to think/work like a scientist
- clarification of career goals
- improved readiness & desire for graduate studies
- increased retention rates

**Process:** There are many ways that students can be incorporated into research. Below are some general implementation ideas along with benefits and considerations (Multhaup et al., 2010; Research & Innovation, 2021; Temple et al., 2019):

**TRADITIONAL / Apprenticeship Model:** The student would engage and work directly with a faculty mentor on a specific research project created by the faculty. The student would assist with different possible aspects such as data collection to actual analysis and write-up, possibility leading to co-authorship.

**Benefits:** provides an excellent, real-life, memorable usable experience. Often results in the most amount of benefits and viewed favorably by students and faculty.

**Considerations:** this requires a large time commitment in order to properly incorporate and guide (provide ongoing feedback) the student in the research.

**CONSULTANT Model:** The student decides what to research and a faculty member supervises the student's overall research project.

**Benefits:** The student is fully immersed in all aspects of the research project from start to finish. This high autonomy hands-on approach forces the student to engage in deep learning by having to inquire and find solutions and proper procedures in order to reach the desired research objectives. Faculty also benefit from exposure to ideas and areas of research relating to current trends and interests. This often generates new approaches, understanding, and even interdisciplinary collaborations that might lead to publications.

**Considerations:** The student must have high levels of persistence and discipline in order to succeed in this high autonomous mode. Although faculty only consult, it still requires organization and some time away from faculty ongoing research and course activities.

**JOINT CREATION Model:** The student and faculty member jointly decide what to research based on shared interests and goals.

**Benefits:** Interests/curiosity are satisfied for both the student and the faculty, develops student skills, and helps them feel more confident by working on the same level (jointly) with a faculty researcher. Often leads to publication which enhances student/faculty CV.

**Considerations:** The development and agreement of an actual research project with specific research questions can take up a lot of time. Depending on the student's current level of research capabilities, a lot of time might be needed for training and development. Requires high levels of persistence and resiliency in order to complete.

**RESEARCH TEAMS Model:** Students come together and form teams and collaborate on a research project together. Research duties and responsibilities are distributed within the team. A faculty mentor provides general guidance.

**Benefits:** Students experience the process of conducting research but share the workload so that the project can be completed faster. Students also develop important soft skills like teamwork, conflict resolution, schedule management, and improved communication.

**Considerations:** Students must be committed, persistent, and self-disciplined. Students must be self-motivated and know how to do all aspects of the research (or be able to quickly learn) and deal with the possibility of a team member not completing their portion/responsibilities or leaving the research team. Students must also be ready to work with a team, dealing with the challenges of different personalities, variable workloads, and diverse schedules. Faculty must also allocate their time to helping the group come up with a realistic research question to address within allowable time frame and be ready to help address issues/conflicts within the research team.

**COURSE BASED Model:** The technique could either be the incorporation of research activities/research skills development within a course or dedicating an entire course to conducting research as its main assessment and purpose. This could be done in many different ways such as a general research course/activity or a major/field-specific course/activity. *This model is highly recommended in that the sooner students are exposed to different aspects of research processes the more they will understand and learn, making it easier for students to then participate in other research models.*

**Benefits:** many successful examples many educators use upper-level specialized courses with labs of a dozen or more students as venues for conducting original research expands opportunity for research

**Considerations:** Requires a lot of time by faculty for preparation and implementation. Various issues could arise dealing with multiple students and different research topics.

**SUMMER RESEARCH Model:** The student would specifically conduct their research or assist a faculty with their research during an intensive summer research experience.

**Benefits:** The students would be dedicated, full time to conducting or assisting with the research. It would be intensive but empowering and beneficial learning experience without the many distractions that are usually present during to regular school year.

**Considerations:** The faculty's and student's summer schedule must allow for this and needed resources (money/facilities) must be available during the summer months.

**SENIOR THESES Model:** This capstone experience would encompass any of the previously mentioned student research models but would be completed or culminate in the student's senior year.

**Benefits:** This is an excellent way for a graduating student to see and use the skills they have developed throughout their time at the university. Additionally, it helps them be fully prepared for further academic research and be even more marketable and capable with the workforce.

**Considerations:** Generally, requires a large amount of faculty time to properly mentor multiple senior thesis students to ensure that they complete all portions of their research on time in order to ensure graduation timelines.

### **Key Aspects to Incorporate**

- **Establish Clear Guidelines and Timelines:** Students involved need to know the expected learning outcomes along with research/project guidelines and timelines. They must know what they are specifically required to complete and the process they are to go through along with deadlines they must meet. A detailed rubric with clear explanations and dates is necessary throughout the mentoring process in order for everyone to understand and meet all expectations.

- **Provide Timely and Consistent Feedback:** Conducting research can be difficult and time-consuming so it is vital that proper mentoring/guidance is incorporated to help students along the right path to achievement. Effective, useable feedback (done on a schedule and additionally when needed) that motivates and helps a student develop/learn is essential for overall success.
- **Create Multiple Levels of Scaffolding:** In order to help students and faculty effectively manage their time, instructional materials addressing research processes and procedures should be created using multiple modalities (videos, infographics, guides, articles, etc.) and placed online. Additionally, discipline-specific research processes, procedures, and requirements should also be made available in different easy-to-understand formats for the students to use when needed.

Engaging students in research is a very worthwhile endeavor that offers many benefits to students, faculty, and the learning institution. Every effort should be made to incorporate at least some aspect of students involved in research at every grade level in order for students to obtain the best and most useful learning experience possible.

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