Great challenges face the faculty in performing undergraduate research in an undergraduate only school. In this presentation, we report why the traditional approach found in institutions placing emphasis on fundamental research and graduate students does not work in a small undergraduate institution such as ours. A key issue is to stray from the mind set of obtaining new and original research results and think in terms of teaching the results of research. At a research institution the emphasis is on obtaining new and original research results so that research funding can be sustained over the years. The work is often accomplished through Master and Ph.D. students guided by a faculty advisor. The graduate students have more maturity and time that allows them to obtain results and communicate their work. Their work can then be adapted to an undergraduate research level project. The equipment used for the research and the graduate students familiar with the hands on aspects of research are readily available to the undergraduate student.

At an undergraduate institution like ours, we do not have graduate students and we can only perform fundamental research during the summer due to our teaching and service loads. Trying to use undergraduate students during the summer to advance fundamental research work is ill advised since the faculty must spend a tremendous amount of time educating the student about prior research. In addition, undergraduate students are often immature and inexperienced to obtain new significant results. It is only when they are ready to leave that they are able to provide some new results and they leave rather abruptly making the transition to the next undergraduate research team a great challenge. Therefore undergraduate research cannot be used as an effective tool to advance fundamental research at an undergraduate institution.

There are also other issues when trying to mimic a fundamental research program at an undergraduate institution that will be addressed during the presentation.

In front of all the challenges, it appears that instead of obtaining new and original research results, undergraduate research could be used to improve teaching and one does it for the interest in teaching. This is done by switching the focus on obtaining new and original research results to focusing on teaching the new principles from current research. This allows the faculty member to stay current with the state of technology and major developments in his/her field of contribution. The undergraduate research projects are used to acquire and test new equipment and the results are trickled down through the curriculum. This is not only a great benefit to all students but also to the faculty mentor and the program and institution. When seeking external research funds, one should place the emphasis on teaching the principles from the latest research rather than on proposing obtaining new and original research results. For many years, we have been fortunate to receive exemplary support from our institution in providing financial support for summer student research fellowships. We have also been fortunate that NASA supports our efforts at interesting students to NASA mission and goals and they have provided us with additional funds for summer student research fellowships and for research equipment. This provides great hands on research experience to our undergraduate students and has improved our programs.

Keywords: Undergraduate research.

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