

Conception and Practice of Oldenburg Team Research

1 The Team Research Concept

Teacher education at the Carl von Ossietzky University in Oldenburg is characterized by an intensive university cooperation with schools in the region. This is a result of the “single-phase teacher education” (ELAB) carried out during the 1970s and 80s. This cooperation is institutionally secured and manifests itself by (among other things) the fact that teachers participate as so-called “cooperating teachers” (Kaiser/ Spindler 2002) in education courses and contribute practical experiences and professional competence. The Oldenburg team research developed in the 1990s in this context, where cooperative research on the part of students and practitioners was made possible and encouraged within schools (Fichten et al. 1995).

“Team research” describes a research conception whose focus is a cooperative, practice-related school and teaching research. In accordance with the concept of action research¹ by Altrichter und Posch (1998) where teachers investigate the inquiries and problems within their own profession, the development of problem solutions and/or action orientations for professional situations lies at the center of the research. The difference is found in the fact that the research initiative is embedded into the existing cooperation structures because it is anchored within university courses. They are of meaning not only for the participating teachers and their schools; they also contribute as an educational element for qualification and professionalization of prospective teachers.

Teams comprised of four or five students, student teachers, and/or teachers investigate questions posed by the cooperating teachers and participating schools (normally via their **control group**). Here, two *levels of development* of team research can be differentiated:

- First, this conception was conducted as a one- to two-semester seminar where the researchers were introduced to the team research conception and familiarized with the research “tools” (this included the formulation of research questions, keeping a research journal, writing exposés, acquisition of research methods, etc.) (Fichten et al. 2002). Around ten research teams annually participated in the region’s primary, special, and secondary schools, who we refer to as “school year cohorts.”

- From October of 2000 to 2005, the Oldenburg team research was tested as part of a German Commission for Educational Planning and Research Promotion (BLK) model test “Lifelong Research Learning in Cooperation with the School-Seminar University” where five schools, two university seminars, and two continued education institutions for teachers participated. A network of cooperating institutions in the Oldenburg/Ostfriesland region was developed. This was meant to intensify the cooperative relationship between the various institutions and the individual phases of teacher education. With help of the network, it was also hoped to enable the students participating in team research as part of their studies to be able to enter into an action-reflection circle during their student teaching, and as new professionals, work through any

¹ We use the term “action research” and “operative research” synonymously. The Oldenburg team research is committed to the concept of teacher research (Döpp 1990; Klafki 2002). Wherever we speak of “research” in the following, we are referring to this research inclination.

practical problems occurring by conducting a minor investigation. Team research aims to improve the three phases of teacher education so that prospective and current teachers can react to developmental responsibilities prescribed by society in a qualified fashion. Here it is presumed that the reflexive-analytical stance developed via team research towards professional practice encourages lifelong (research) learning, and that this connection is productively unfolded when a suitable framework in the form of structurally similar occasions/opportunities for learning are created. Because new problem constellations and development tasks arise throughout the course of a professional lifetime, a continual revisiting of the process of research learning is necessary, possible, and a good idea.

For the German Commission for Educational Planning and Research Promotion (BLK) model attempt context, various opportunities for communication are prepared and organized as workshops (this includes method workshops, analytical sessions, and presentations). What should be emphasized is that over the course of the model attempt, it is certain that research will repeatedly be conducted in the same institutions. Due to this rather long-term perspective, the steady accompaniment of school development processes in the participating institutions benefits from research (Fichten/ Gebken/ Obolenski 2002). The questions and results of several investigations can be related to one another, and drawn together for complex school development projects by means of a rationally staged procedure.

The “Research Center for School and Teacher Education” established at the University of Oldenburg (Fichten 1996) plays a supporting role in this process. Team members accompany the research process(es) of the individual teams, support them in the formulation of problem solutions, and initiate reflection upon learning and professionalization processes. This occurs as a result of (among other things) the motivation to arrive at a team agreement (“work contract”), through the examination of quality criteria of research, through team supervision, and through regular survey investigations.

2 Goal and Intentions

Three primary goals can be formulated for the Oldenburg conception:

1. All participants are to gather learning experiences through the research work that can contribute towards personal professional development.
2. The research work is to be a forum for acquiring new findings in schools, university seminars, and universities.
3. The completed research work and the investigation findings coming in from the schools/institutions contribute towards the continued development of schools/seminars and teaching.

The professionalization processes motivated and made possible by the research involve two realms:

University Students and Teachers Perform Research on Schools

On the one hand, research questions are formulated based upon the findings coming from real-life school situations. University students with an interest in these research questions and who participate in a research project do research in the professional field they are working towards during their training. They temporarily put aside the university perspective, and have a chance to get to know their future work from another perspective than they would e.g. during student

teaching. Student teaching examines the role of teacher in terms of the first step of the training, focusing on the profession for which the trainee is working, and there is more of a concentration on identification and taking on a role. However, research work involves approaching the future field of profession from an investigative point of view, i.e. one that remains at a critical distance (also see Schneider/Wildt and Frenzel in this publication). University students can also obtain insights into everyday teaching life and sections of school in which they do not have training, and where they will not teach when they become teachers. We think it's a good idea when e.g. a future teacher for the *Gymnasium* (German secondary school) has a chance to observe what it's like at a *Hauptschule* (German vocational school). In total, the practice obtained during training is intensified by the findings acquired via research into school and teaching situations.

University Students and Student Teachers Research (Their Own) Teacher Education

On the other hand, questions arising in the seminars of the second phase of training and from the university can be investigated. University students research aspects of the first and second phase of teacher education, and correspondingly reflect their current and future educational situation. The second phase in particular is an unknown realm for many students, and contains hardly any definite findings. Because they acquire insights into seminar practice during their time at university, requirements and competency expectations become transparent, which allows (among other things) a more clearly-defined university education, the tending to any previously existing lacking knowledge, the removal of any deficits in ability, etc. This concept underlies and borrows from Donald Schön's (1983) model of the "reflecting practitioner" of the continually developing structural-theoretical professionalization approach (see Feindt 2000). Due to self-directed learning, practitioners who reflect have the ability and willingness to change themselves. It results that they can always "tune in" to their students who come into the classroom with entirely new socialization experiences. As a hypothesis, we formulate that a considerable part of these professionalization competencies are conveyed and/or can be solidified and deepened via participation in team research projects (see Meyer in this publication).

Due to its team components, the Oldenburg research is characterized by mutual relationships, group building, and cooperative work structures. This can have a function that improves life and learning quality, and can also help develop a sense of identity for the individual. University teacher education to this point has mostly been characterized by individual work, occasional presentations with other partners and, to a partial extent, by group test preparation. Team research is associated with an "effective involvement in the social relational interweaving" (Feindt 2002, 54). This allows an improvement in the social integration at the university that is connected with reciprocity, unified action, and emotional empathy.

When research is talked about here, it means a systematic observation, done from a distance, of the professional practice. It involves an empirical, realistic check of subjective hypotheses and assumptions. Research understood in this way is centered on finding solutions and is goal-oriented. The learning process is comprised of questioning and, if needed, modifying previously not-reflected-upon reality constructions via a change in perspective made possible and guided by research (see Fichten in this publication). The theory-practice connection taken up in the research process and the interweaving of action and reflection can be shown to be (among other things) particularly productive for lifelong learning. After all, the participants have the possibility to experience their own learning and cognitive process as practically outcome-based. Research learning is not only person-centered; it also has systematic effects. It aims at the restructuring and change of the learning and professional realm (Obolenski 2001).

3 The Structure-Providing Framework

A rule-bound and systematic practice research approach requires teachers, student teachers, and university students to be introduced into this practice, and be equipped with the corresponding competencies and operative instruments to assist in their research activities. They have to learn the “rules of the game,” structure, and systematic research behavior, as well as quality criteria for research as a means to reflect upon their own research process and subsequently be able to evaluate it. The knowledge previously conveyed in seminars and, recently, in BLK (see above) one-to-two-day workshops provide strategically and pragmatically meaningful background knowledge upon which the research process orientates itself.

In the German-speaking realm, research learning is realized via a wide variety of participation forms, including assisting in a research project, all the way to heading a study (see Garlich 1996). Those participating in team research have the opportunity to form research as a uniform learning/knowledge process in their own fashion, and direct it themselves through all project phases.

We first assume that all team members are novices when it comes to research, i.e. they have no experience at all with research. The workshops provide for a comparable, balanced-out level of knowledge, and create a structure-providing framework for the individual research projects. At the same time, during the starting position described above – at least regarding the cooperative research – a moment of equality among all team members can be seen. This fundamental constellation is modified in the BLK model attempt through the participation of individual teachers in several research cycles, so that teachers with research experience are put together into teams along with those new to research. This needs to be remembered in the didactic-methodic workshop formation (see below). Because a systematic and overall introduction to research processes and modalities, and not just a “training in methods” is provided, in the following we discuss a team research curriculum whose entire conception can be seen against the background of specific conditions:

Scientist/University Teacher and Team Researcher Relationships

The scientists are not team members. They do not participate in the research. Instead, they:

- take care of the organizational aspects
- over the course of several workshops, convey the basis of team research and findings on empirical research methods, evaluation procedures, and feedback modalities.
- provide the teams with feedback on the research exposé and on the final research report (see below) and
- during the research process, upon request consult the individual teams on research questions.

The team researchers perform mostly self-directed research on their own initiative(s). They investigate their own problems (these are not prescribed to them or derived from theory contexts), develop data interpretations, and derive from them the conclusions and action consequences that correspond to the respective practice conditions (Fichten/Gebken 2004).

The scientists² therefore understand themselves as moderators and “critical friends” (Altrichter/Posch 1998; Schönig 1999) and see their role mostly in quality control of the research as well as in consultation in research-related decisions.

Team Interaction

Every team works according to the own logic deriving from the respective process dynamic as well as the particular research circumstances.³ Because of varying “research paths” and phase sequences within the individual teams, the conveyance of research-practical knowledge cannot always be synchronized with where the research groups specifically are at a given time and the resulting information needs. Team-specific proceedings and inter-team communication at the workshops have a complementary relation to one another. Therefore, it’s important to use the workshops as a forum for the exchange of ideas between the teams, and activate the potential of the competencies available among the participants. This occurs e.g. in the staging of reflexive situations in a two-team setting where the members of a team function as “critical friends” for the other team, and consult them as well. In presenting the exposé, and most importantly with the presentation of the research findings (see below), the workshops form a “community of practice” (Wenger 2000) where the individual research project is assessed not only in relation to the value of its findings and its relevance for real-life teaching problems and/or developmental tasks, but also where research experiences are conveyed (e.g. in implementation modalities of narrative interviews), i.e. where people learn from each other in a research-related fashion and, in doing so, expand research competency (see the work by Meyer in this publication).

Learning Location and Networking

Workshops are only one of many learning locations used by the team over the course of the research process. For us, a learning location is a real and/or virtual location where several people work together in a goal-related, production-oriented fashion, and reflect the learning processes that occur. A multitude of learning locations are sought/constituted in the learning and cognition processes motivated by research (e.g. libraries, internet, team sessions. This also includes project phase sessions: partial group meetings, **encoding** in tandems, etc.). The meetings with workers from the research workshop that derive from the utilization of support and consultation should also be mentioned. Accompaniment includes the formulation of solutions for research problems that occur and the meta-communicative clarification of team-internal processes, as well as information on special issues (e.g. variations of content-analytical evaluation procedures) and, with this, a deeper concretization and/or expansion of workshop foundations.

Workshop Learning

The didactic-methodical side of conveying findings and competencies plays an important role. Theory-oriented elements are tied together with action-oriented units; possibilities of an active and – as far as possible, concrete-practical – content acquisition and its subsequent trying out are planned in with the workshops (exercises, role play, etc.). The participants are to obtain clear “pictures” and ideas that are as tangible as possible regarding the research situations and challenges they encounter. Here, the reports of former team researchers and examples from previous research cycles are of particular value.

² Over the course of the years, the number of participating scientists has increased. Currently, five experienced team research colleagues with a variety of tasks and responsibilities are overseeing the team.

³ For example, a survey of high school graduates must be done before graduation.

4 The Curriculum

What are the individual components of the team research curriculum?

Research follows an internal logic and is characterized by the principally not-reversible succession of certain steps. These are summarized into a process model in Figure 1:

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Figure 1: Meyer: Process Model

Curricular building blocks were developed for all stages of a research process (see among others Fichten et al. 2002).

Workshop I: Introduction to Team Research

(1) Research

- Action research features and team research conception
- Research quality criteria
- Research journal
- Team research process model
- Presentation of research topics
- Help with and instruments for a change in perspective
- Clarification of starting points for research (e.g. analysis meeting, see Altrichter/ Posch 1998, 81)

(2) Team

- Team comprehension and definition
- Formation of the team
- Team contract/ work cooperation
- Initial team meetings

Workshop II: Types of Research and Research Methods

(1) Research

- Types of research
- Research method overview
- Station learning on selected research methods
- Research planning: Exposé

(2) Team

- Fine-tuning of research question within the individual teams
- Reflection in a two-team setting

Workshop III: Data Evaluation

- Evaluation modalities
- Qualitative evaluation
- Quantitative evaluation

Workshop IV: Presentation of Research Results

- Criteria for the evaluation of research results
- Presentation of research results from the individual teams
- Research report
- Modalities of research result(s) feedback to the field subjects and institutions

Workshop V: Outlook

- Implementation
- Feedback on the effects of team research at the individual institutions
- Evaluation of research cohorts

Conveyance of method cognition in the team research workshops is comparable only to a limited extent with the method formation found in other university tracks. We follow the exemplary principle: Only a few research methods are introduced and thoroughly processed (mostly observation, group discussion, interview, surveys), and further methods are only briefly reviewed. Teams are told to (if needed) independently incorporate other methods and/or be assisted by research workshop members in this process should they see them as appropriate for their respective research project. The second selection principle is the “doability” (Oswald 1997) and/or practicality of methods. The possibilities to shorten the investigation process (Schütze 1994, 280 ff.), are therefore of great interest, as most teams during their research apply several methods, and easily reach their full capacity and find themselves overloaded due to this multi-methodical research (Lamnek 1995). The team research mantra of “small is beautiful” is therefore a good rule of thumb to follow.

5 Products

Discussion, action, writing, and reflection are all elements of research learning that play their own essential role. Research isn't simply cognitive processes and the oral exchange of impressions, meaning, etc. Instead, it is manifested and concretized via material products:

- Team researchers are encouraged to keep a research journal (see Altrichter/ Posch 1998, 26-50; Fischer 1997). This journal is to document the individual researcher's observations from the field and his/her process-accompanying reflection(s). Workshop experiences and team meeting content are also to be recorded. Processing of journal entries helps enrich the research: In the concluding process analysis, a systematic and detailed research process reconstruction becomes possible.
- Between the second and third workshops, the teams must present an exposé to the other teams which is commented on by the scientists and academics. We see the exposé as a (preliminary) written summary of the research idea and the plan for its implementation (see Fichten et al. 2002, 20 ff. for further details). The exposé creates transparency both within the team and outwardly, and provides orientation for further action. It is also a way at the end of the research process to see whether the aimed-for steps, procedures, etc. were put into action, and can determine where and for what reasons the original plan may have been deviated from.
- At the end of the research, the teams compose a research report on team-internal self-certainty and **data (Rechenschaftslegung)**. It also serves to communicate the acquired findings to research partners and anyone else interested (see Altrichter/ Posch 1998, 233ff.).

6 Integration into Teacher Education: Teacher Certification

As opposed to other tracks of study (e.g. sociology or psychology), the inclusion of research methods into the study of education has to this point had a rather secondary role.

Methodenausbildung is mostly concentrated on the *Diplom* and continued education courses of study (Schumann 1997). But with the introduction of the Bachelors and Masters tracks of study into the German university system, it will take on a noticeably greater significance. Here, useful application and combination opportunities already are in place, including **Methodenkenntnissen** and study elements, and contents such as e.g. student internships and the state examination

(required in Germany) which, if acquiring more empirical attributes, could obtain greater quality. Three factors speak in favor of a stronger consideration of intermediation:

- When, from a professional-theoretical view, the competence of teachers, educational situations, and the actions of interaction partners (students, colleagues, parents) is seen as a major attribute of the professional ability to act, teachers have to be able to research their own work. “The ability for an empirical observation of recipients and own action doesn’t just have future teachers’ abilities in mind. It also communicates those qualifications that are a (reflective knowledge) requirement for (current) teachers to further qualify themselves over the course of their careers” (Beck/ Scholz 1997, 688).
- Should the required school-internal evaluation (in connection with school program work and school development) become a reality, teachers will need a basic methodical knowledge. Information on methodical knowledge prepares future teachers during their studies for these tasks, and enables them to take an active role in school change and development processes (see Bastian/ Combe/ Reh 2002).
- Furthermore, basic knowledge in empirical methods has relevance for the content side of school teaching/learning processes. Corresponding methodical findings have to be communicated to the students not only as part of the scientific-educational teaching on the secondary level, but on *all* levels. This must come into practice e.g. in the carrying out of student experiments, investigative projects, project weeks, etc. With this, an introduction into empirical research methods in educational studies is legitimized.

7 Research Learning in Team Constellations

One particular attribute differentiates Oldenburg team research from other research practices. This is seen in how one person, i.e. the teacher, is both an active individual in a professional practice and simultaneously a member of a research team who investigates both the practice and cross-sections of the work. In other words: The teachers on the one hand are actors and co-producers of a social reality and, on the other hand, involved in research projects that are to be observed from an analytical distance. In team research, the individual contributions of teacher research are thematized. This is especially the case with the investigation of interaction problems with students in the own classroom. But even with research questions deriving from school development tasks related to school development, it remains that the teachers are members of the institution and, parallel to the research, continue to be involved successfully as both those affected and participating at the same time. Although this constellation results in problems that need to be taken up in the research process, it simultaneously opens up particularly interesting opportunities for discovery and learning.

The **basic figure** of an interpretive social research is found in the fact that researchers partake in a dialogue with the field subjects, overcome distance and “foreignness” step-for-step, and obtain “object intimacy” via cognitive processes (Kleining 1994). As opposed to research groups where for the most part all researchers have the same distance to the research field and research object, the team research setting is characterized by an appropriate ratio of closeness and distance in the subjective field approach. The university students perceive lessons and school as quite interesting, but still maintain a “foreign point of view” that the teachers are “ensnared” in their everyday professional life of routine and things that are simply a “given.” This array of distances results in a variety of structured reflection movements and “research paths”: The teachers strive to keep themselves from being “right next to” their teaching, and create distance to their work. For the university students, it’s the other way around: They aim for a nearness to the teaching

field in order to understand the foundational structures of educational action and school situations. Both movements influence one another, must be coordinated, and will optimally lead to the establishment of “internal structures that provide meaning and meaning analyses” within the team (Schüle 1979, 311) as well as the constitution of a cooperative analytical framework necessary for a productive data analysis and interpretation (Strauss 1991, 185). The teachers who also participate in the research have access to case- and situation-related context knowledge that can constructively be included in the research process. However, a requirement here is that the knowledge items that are applied to practical theories (Altrichter/ Posch 1998) are surveyed with regard to the assumptions and hypothesis therein (assumed if-then relationships), a normative postulate (“as a teacher you should/should not...do/do not do”), and own situational meaning. The team constellation favors this explicative work, because here, dialogue regarding own professional work, about educational expectations and standards, etc. is more open and, for the most part, much more freely done than within a council. Additionally, student researchers must be provided with more explanations and justification than is the case with colleagues, who are most likely already familiar with the information due to their inside knowledge. In order that the context knowledge of practitioners does not dominate the research process, the university students must seek out field contacts to establish their own reference points. Diverging situation perceptions and estimations provide an openness in the research process and provide opportunities for a change in perspective. If people actually take their time in harmonizing them and abide by them, they result in contrastive interpretive readings in the data evaluation that lead to differentiated, multi-faceted research results that come from this constant process of comparison (Honer 1989).

The special role of researching teachers comes into play in the final phase of a research project. He/she can be presented with the question regarding the “readings” generated from the data of which action possibility he/she would choose. For the university students, in “playing with the possibilities,” a picture is created of (future) teaching as one in which they can influence and form the action realm. This is effective in working against the capitulatory attitude of “Well, there’s nothing you can do anyway.” As our experiences and evaluation results show, team research as a rule leads to a strengthening of a professionally-related self-confidence on the part of students which manifests itself (among other things) in a stabilized sense of self-effectiveness and in extended action and reflection competencies, as well as in an educational/teaching “optimism” (Fichten/ Gebken 2004).

8 Perspective Limitation

The research topics that the teams work on are as a rule suggested by the cooperating teachers, who have previously agreed upon them with the control group or school administration. The university students on the other hand have more of an interest in learning how to research and receive real-world training (see above). Most teams also succeed, as the following example will show (pg. XX), in making the research topic personally meaningful for the student. Case-related knowledge and contextualized, situation-specific research findings are transferable only to a limited extent. More important are the general research experiences, e.g. becoming familiar with foundational structures of research action as a progression of rule-bound, sequential operations. The students learn meaning and modalities of individual process phases and steps. They obtain competencies in the application of empirical methods via retrospective process reflection upon successful procedures as well as on the difficulties they encountered and learned from. They can convey appropriately-applied theoretical knowledge obtained during their studies

with practical action knowledge. Last but not least, the varying perspectives substantiated within the team can lead to an enrichment and/or restructuring of own perspective constructions.

Students Who Don't Participate

One teacher reported to the research team that in one of her groups there were students who very rarely and/or never raised their hand to contribute to the lesson. She saw this “silence” on the students’ part as a problem, particularly when it came to evaluating their participation (see Dählmann/ Fangmann/ Visser 1996). The presentation of the research topic was met with great response. In the reflection coming from the “critical friends” of another research team (reflection in a two-team setting), it was discovered that almost all those present were familiar with this problem from their own experiences. Furthermore, some of the university students participating in the team admitted to belonging to this group of students who didn’t want to participate when they were in school. With this, various subjective additions were made to the research object:

- The university student approach is learning-biographically situated. They are partially familiar with the difficulty problematics from their own experience that are now relativized through research. The research project allows a distanced processing of the own educational-biographical experiences.
- The teacher approach mostly derives from professional experience. They hope for information from the research on why students will not speak or participate, which can contribute to an explanation of the situation and, most importantly, provide a sense of security (regarding among other things grading of performance) when dealing with situations.
- The issues obtain an additional dimension (for the university students too) via the real-life teaching approach explained by the teachers: They are able to recognize the research topic as a fundamental problematic. Partially identifying with the teachers, they anticipate moments of future teaching. The disposition towards multi-perspective situative cognition and meaning initiated by research is to be seen as an essential element of professional activity. It works against the tendency to shorten interactive school and teaching processes to the (own) teacher perspectives and, in doing so, narrow the own spectrum of activity. These dispositions form a “researching habitus” and/or a “professional core of demeanor” (Schütze 1994) which arise in the ability to observe your own work from a distanced-analytical perspective, and which are reflected in both an exploratory and reflexively oriented “feeling out” of school situations and teaching constellations. This disposition becomes particularly relevant and pragmatic – as individual cases show (see the contribution by Dreier in this publication) – when university students, in the second phase of their student teaching, and then as professionals new to the field, again become involved in an action-reflection cycle encapsulated and made possible by research.

9 The Impacts of Team Research

More than 300 students have participated in the Oldenburg team research over the past ten years. The introduction of these prospective teachers to research learning and concrete empirical investigations in schools, university seminars, and at the university is the special contribution of this research conception. The significant amount of student time invested (participation in five workshops, weekly team meetings, and extensive data evaluation) is rewarded with the Lower Saxony examinatory “Project Certification.” A particular quality of team research was found in the fact that the university students were continually successful at placing the viewpoints of the school students in the spotlight. They understand themselves as more of student “lawyers” (also see Baumgartner et al. 2000) and put into question the “givens” of teacher decisions and actions. Contact to field subjects/research partners was very successfully achieved in a short amount of

time. Conflicts of loyalty (here, lawyers for the students – there, curious researchers) have to be tolerated. The “ethical code” mentioned and discussed at the workshops offers an orientation for this.

This impression is also strengthened by the particular interest in research methods that are capable of comprehending student perspectives. Student surveys and interviews, group discussions with students, as well as paper writing are frequently applied as tools. An important developmental task of Oldenburg team research is seen in the mediation of age- and personality-relevant research methods (see among others Heinzl 2000).

10 Implementation into a University Course of Study

In Oldenburg itself, about eight percent of education students participate in team research. Student demand is actually larger, but greater capacities are not available. This means: The goal of making research learning into an everyday element of reflexive teacher education is still not within reach. Necessary for this is:

- Participation in a research project has to become a mandatory part of university study.
- During the second phase, the tight fixation on hour/credit requirements must be relaxed, and team research must be accepted as an educational content.
- To allow a greater amount of students the opportunity for participation in a team research project, more university professors must become familiar with this research approach, and offer corresponding courses.