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Appalachian Collaborative Center for Learning, Assessment, and Instruction in Mathematics
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Findings from Inverness Research Associates' Evaluation of the Appalachian Collaborative Center for Learning, Assessment, and Instruction in Mathematics (ACCLAIM)

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ACCLAIM's mission is the cultivation of *indigenous leadership capacity* for the improvement of school mathematics in rural places. The project aims to (1) understand the rural context as it pertains to learning and teaching mathematics; (2) articulate in scholarly works, including empirical research, the meaning and utility of that learning and teaching among, for, and by rural people; and (3) improve the professional development of mathematics teachers and leaders in and for rural communities..

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Funded by the National Science Foundation as a Center for Learning and Teaching, ACCLAIM is a partnership of the University of Tennessee (Knoxville, TN), University of Kentucky (Lexington, KY), West Virginia University (Morgantown, WV), Marshall University (Huntington, WV), University of Louisville (Louisville, KY), and Ohio University (Athens, OH).

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Foreword

This paper presents an overview of the findings from five years of the third-party evaluation conducted by Inverness Research Associates. The principal sources are reports developed by Mark St. John, Jenifer Helms, and Anita Smith in early 2005. The material from those reports has been incorporated into a single document and factual information about more recent Center activities has merely been updated. The edited and updated manuscript was reviewed by Inverness, and final changes were made according to their specifications. Appendix A notably includes case studies of nine ACCLAIM doctoral students, added to the manuscript early in 2008.

The end of the original NSF funding (August 31, 2008) seemed to the Center's management team an appropriate milestone at which to make public the Inverness evaluation work. The point of this report, then, is to provide a publicly accessible document that captures, with arguably objective evidence, ACCLAIM's conception, struggles, evolution, and accomplishments. This accounting seems to us at the Center a requirement for any effort that has expended more than $10 million in public funds (one major grant and one supplemental grant). Indeed, we expect, and are planning, to continue the Center's doctoral and research efforts into the foreseeable future and have enrolled a third cohort of doctoral students who have now completed about half their coursework.

A brief background on the Center seems helpful at the beginning of this report. Throughout its existence the Center has undertaken three strands of work, intended to be mutually dependent and reinforcing. These strands have included (1) a multi-institutional doctoral program in rural mathematics education (officially known as the "capacity building

initiative"); (2) a research effort directed from Ohio University (the "research initiative"); and (3) a service effort with a varied portfolio (most recently known as the "teacher development initiative"). On September 1, 2006, the original grant period ended, and the two remaining initiatives from that point forward have been the doctoral program and the research effort. The decision to continue these two strands was based in large measure on the report presented here. Indeed, the Center's management team and its third-party evaluators would agree that doctoral work and research have been the Center's most successful efforts. The reasons that such a claim might have merit are not considered in depth in this paper; all parts of the Center struggled mightily to do good work and all accomplished their intentions less than perfectly. The struggles have produced substantial and ongoing results, the Center's management team would argue.

One caveat is in order here, however: The Center's management team believes that what goes on in communities and schools and classrooms and the minds of students and teachers is the point of the work accomplished and the work still in progress. "What goes on" is not a simple, obvious, or widely understood matter, especially when it comes to rural places. That's why it's particularly important to have doctoral programs and research efforts in rural mathematics education. The world is simply too often not what it seems, and this is why some of us insist that difficult and dangerous questions must be asked…and addressed. We have done some of that work in the Center.

We suspect that our students have become colleagues in this effort. The legacy of this work, at any rate, lies in large part with them.

Craig Howley
Athens, Ohio
April 28, 2008

Introduction

The purpose of this summary is to provide the public with an independent external assessment of ACCLAIM. We draw upon all the knowledge of this Center for Learning and Teaching that we have accumulated in past years, and we refer to that data throughout this report. We begin our assessment by outlining our assumptions about the role and purpose of the Centers for Learning and Teaching (CLT) Initiative, designed and funded by the National Science Foundation:

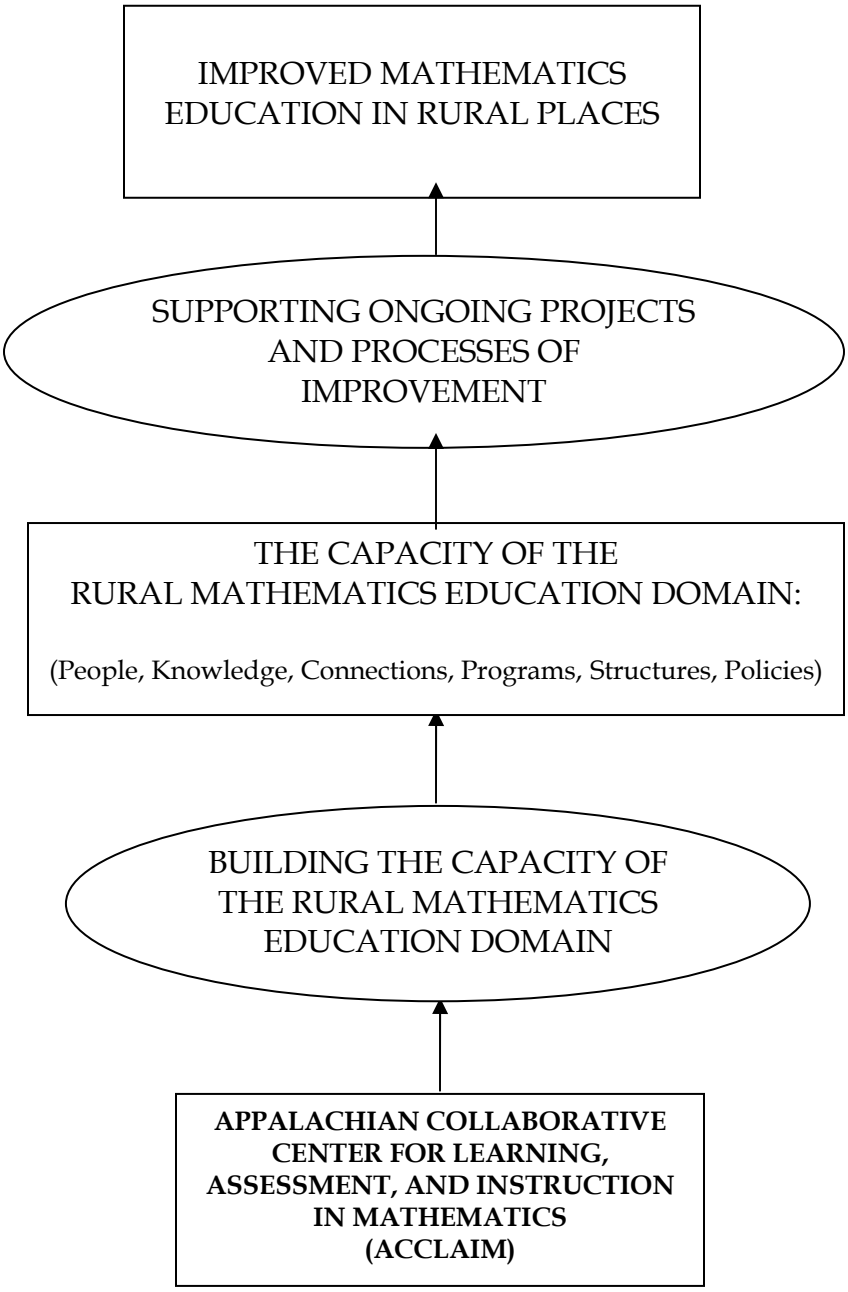
We understand that the primary purpose of the CLT initiative is to build the capacity of the STEM (Science, Technology, Engineering, and Mathematics) field for undertaking future improvement efforts. That is, the CLTs are *not* intended to provide direct service to the field, but rather to build capabilities in key areas of STEM that are understood by the Foundation to be critically important to the support of national, state, and local improvement efforts.

Specifically, we see the CLTs focusing on some critical capacity outcomes: they are designed to develop *leadership* in the domain; to generate, apply, and disseminate *new knowledge*; to forge and nurture *new relationships and connections* among those working in and around the domain; and to create new *structures, programs and policies* that support the ongoing development of the domain. (We have postulated these outcomes as "CLT drivers" in the sense that these outcomes are driving all of the design and implementation efforts across the CLT initiative.)

CLTs, we also assume, are meant to have all the characteristics of productive "Centers" – that is, they are meant to connect many key players in the domain and they should be more than a partnership between member institutions. CLTs should achieve what we call "centerness" which

has both an external and internal quality. Externally, CLTs should serve as a center for the field in terms of contributing to – and drawing upon – improvement efforts across the domain within which the Center is working. Internally, key members of the Center should work together in complementary, even symbiotic ways, such that the whole of the Center is greater than the sum of its parts. *Centerness*, we therefore believe, is an all-important fifth "driver" for the CLTs.

The ACCLAIM CLT seeks to build capacity in the Appalachian region for improving math teaching and learning. Our interactions with Center leaders permits us to represent their theory of action in the following diagram.



This diagram can be read as follows:

ACCLAIM is a Center that defines and organizes the specific domain of rural mathematics education. Through the CLT drivers, ACCLAIM engages in a long-term process of strengthening the foundational capacities of the rural mathematics education

domain. The strengthened domain, in turn, is better able to contribute to all of mathematics, but is also better able to support ongoing projects and processes of improving the teaching and learning of math that takes place in rural places.

The Appalachian region, in which ACCLAIM works most closely, suffers from decades of intentional resource extraction and depletion and, contingently, from a narrow development base (i.e., one designed to serve the extraction industries). Education achievement is, in general, behind applicable state standards, as are many other indicators of community well-being and health. The ACCLAIM project represents a long-term investment in the capacity of the region – a partial contribution toward creating the ability of the region to sustain its own processes of improvement in the future. In addition, the lessons learned from the ACCLAIM experience and the research conducted by ACCLAIM faculty and students can arguably inform development efforts in other impoverished rural areas around the country.

Again, we base our findings and interpretations on the data that come from three years of interaction with the Center. Specifically the sources include:

- **Interviews** with ACCLAIM Faculty, Leadership Institute participants, Professional Development Teams participants, ACCLAIM management team, and doctoral students
- **Surveys** of doctoral students and Teacher Education conference participants
- **Observations** of ACCLAIM major events and programs
- **Case studies** of graduate students

This report is in essence a summary of all the data and major findings of our various reports, previously provided to the Center's Management Team and to NSF officials—as well as our interpretation of the significance of these findings. It is worth noting that throughout the past

five years, Inverness Research Associates (IRA) has regularly brought feedback to the management team, feedback that has often changed what the Center has done.

Strengths of the Center

ACCLAIM is characterized, we find, by a number of strengths. We discuss these strengths organized by the CLT drivers identified above.

Developing Leadership

ACCLAIM has succeeded in addressing the issue of leadership capacity in a number of ways, most prominently through its doctoral programming, but also notably through its leadership institute. In addition, involved faculty testify to the effects of their involvement on their own leadership development.

Doctoral program. The Center has created and developed a **doctoral training program** that has attracted and retained 30 quality doctoral candidates in the region, the result of two previous cohorts of admissions. As of this writing, ACCLAIM has also recruited a third cohort of students, this time (beyond the term of the original grant) generating 39 applications nationwide. Faculty have admitted 18 students (all of whom accepted). Three additional students occupy waiting-list status. Admission to ACCLAIM has become selective.

The cohort design, coupled with the distance learning component, has proven quite robust and has enabled students to remain fully employed in the field as they study it. Moreover, students are sponsored to attend national and regional meetings and events, as both a professional learning experience as well as acting as representatives of the Center. According to our interviews with them, these doctoral candidates intend, for the most part, to remain in

Appalachia or at least in a rural area, and most intend to remain in a teaching and/or leadership capacity. Curriculum remains unchanged for the third cohort, and the program's message of local service in rural areas will likely remain. It should be noted that the Center's research has always articulated a national and even international scope.

We turn next to a summary of findings derived from our case studies of nine students from the first two of the three ACCLAIM cohorts (case studie appear in Appendix A). The first cohort, of course, is the one with the longest history of participation in the Center's activities. Key findings are presented in boldface.

All of the doctoral students in Cohort 1 were interviewed several times over the last three years. Nine in particular were identified for an additional interview for the purpose of these individual profiles. Each student read near-final drafts of their "case" and gave permission for their names to be used (see Appendix A for profiles). While each student represents a unique history and experience in ACCLAIM, some commonalities have emerged from our case studies. What follows is a very brief overview of some of the shared themes we heard in our conversations with these nine students. We have highlighted the major lessons these cases studies suggest to our team.

Overall, ACCLAIM has been a profound personal and professional growth experience for them. The courses have opened their eyes to new ways of thinking about their current work. The internship experiences have provided unique opportunities to deepen their understanding of the field. The writing and reading assignments have pushed them in ways they have never been pushed. The cohort itself has been a source of both collegial and personal support. As a result, they feel ACCLAIM is preparing them to assume leadership roles in the region upon graduation.

These 9 students entered the program eager to learn some things to take back to their jobs, or perhaps find a position in another school or in higher education. **Their experiences in ACCLAIM have increased their resolve to take back what they know**, and to improve the work they do as well as the work of their colleagues.

The courses, reading, and other work related to deepening **their understanding of the rural context and its implications for math teaching and learning** has been very powerful and life-changing. One student remarked that she will never see the world in the same way again. Another suggested that it is because of the work on "rural" that he will likely stay in a rural area (whereas he was undecided prior to ACCLAIM). While some students have not focused their dissertation work on rural issues, their understanding of this domain has nonetheless influenced their thinking about their research.

Connection to and interaction with ACCLAIM faculty and other experts has been extremely valuable. Through conferences, courses, internship activities, and meetings, students have met and had substantive conversations with a variety of scholars and experts from across the nation, which has both inspired and intimidated them. Ultimately, they feel they are participating in a very high quality doctoral program.

If it were not for ACCLAIM, these students would not be pursing graduate studies. One of the most valuable features of the program for these students is that it is set up to support working people.

Faculty development. ACCLAIM has put together a large pool of good minds to talk about how to best orchestrate a doctoral program for students interested in rural math education, and how best to create professional development opportunities. Any one of their institutions might get together and think about that, but when you have a collection of them thinking about it,

it is a great strength. The interviews with ACCLAIM faculty suggest that, in the main (key findings in boldface):

There is a group of talented and committed faculty (nearly all of them senior level) who are willing and motivated to help the Center succeed. As the interview data suggest, the faculty are involved not because of extrinsic pressure or sense of duty but because they are deeply committed – on a personal level – to the mission, as well as to the people involved in the work. They report that the benefits of their participation far outweigh any cost.

These faculty see their personal career trajectories increasingly aligning with the mission and vision of the Center. More and more, faculty see a place for themselves in the Center's mission, and can imagine ACCLAIM as a central or at least highly significant forum and locus of work in their professional lives. Three (senior) faculty stated that their work with ACCLAIM has been the highlight of their career.

These faculty view ACCLAIM as a "place" to which they make valuable contributions and from which they derive important benefits. All of the faculty believed they both contributed to as well as drew from the work of the Center. Even those faculty who were, from their perspective, only nominally connected to the Center (i.e., they taught one course) feel their contributions were significant, and that they benefited from the experience.

They believe the Center is fostering the professional growth of quality graduate students. Every faculty member commented that they believed the graduate students recruited by ACCLAIM are top quality and quite comparable to graduate

students they have taught in the past. While they raised minor concerns about the graduate program, in general, they believe that the students have grown considerably and exhibit the qualities necessary to build leadership capacity in the region.

Faculty believe that ACCLAIM is grounded in and buoyed by the work and oversight of a talented collection of individuals – both in teaching and research. Each faculty commented, in some way, on the quality of other faculty involved in the Center, and their commitment to the mission. They were particularly confident in the abilities of the management team to maximize the potential of the Center. See Appendix B for further detail on the evaluation's findings with respect to Center faculty.

Leadership institute. The Center has developed a summer institute-based program for 30 **math education leaders** in the region. These leaders (teachers, district-level personnel, college professors) report that the institute plus the follow-up meetings have provided some of the most valuable professional development in their careers. Some of them have used their new knowledge and skills to offer professional development to their local schools. Importantly, the ACCLAIM Leadership Institute provided the foundation for a network of leaders in the region, building connections among those working to improve math instruction and learning. It is also worth noting that four (?) graduates of the Leadership Institute are currently ACCLAIM doctoral students in the second cohort.

Together the three groups of participants – doctoral students, leadership institute participants and faculty -–comprise a strong pool of current and future leaders of mathematics education in the region. In addition, the leaders of the Center – the PIs and Management Team members – have been and are increasingly assuming prominent leadership roles on a national

level, both within the CLT community and external to it. In sum, ACCLAIM has made significant progress in developing leadership among its participants and the audiences it serves.

Knowledge Creation, Use, and Dissemination

To date the ACCLAIM Research Initiative, housed at Ohio University, has developed a **website and on-line magazine** (16 issues as of this writing). The website also includes a "Research Clearinghouse" for sharing the Center's working papers (38), occasional papers (15), digests (8), and monographs (5). Among the monographs, working papers, and occasional papers, 17 have enjoyed subsequent publication in peer-reviewed academic venues.

The Center's research agenda is framed by **12 key questions** that address teaching, policy, and culture in rural math education. This agenda and its development is documented in one of the Center's occasional papers.

The Center has hosted three **Research Symposia** in Ohio, where scholars in mathematics education, mathematics, and rural education, as well as doctoral students and young scholars, spend two days sharing and discussing research. Invitees come from all parts of the nation and have included nationally prominent researchers in the related fields.

The **Teacher Education Faculty conferences**, hosted by Marshall University, have provided a venue for teacher educators across the region's 90+ institutions of higher education to learn about and share work in mathematics teacher education. This work is being continued after the end of the initial NSF grant by the Appalachian Association of Mathematics Teacher Educators (AAMTE), about which more will be said shortly.

To summarize, the ACCLAIM research effort has proceeded along two fronts: they have tried to define the field and identify promising research questions, and they have sponsored,

collected, and disseminated research that speaks to the developing field. Through the mechanisms mentioned above, the research strand of ACCLAIM is (1) helping to bring rural issues and understandings into the mathematics education community; (2) bringing mathematics education issues into the rural education community; and (3) influencing more and more people in both domains to think about and work in the intersection.

Connections and Relationships

The Center sponsors an annual **Research Symposium** where doctoral students, ACCLAIM faculty, and others from around the country meet to discuss research issues related to the field. A fourth symposium will be held in the spring of 2007.

The summer **ACCLAIM Leadership Institute** and follow-up activities have connected math education leaders from around the region and beyond to learn, share, and build upon best ideas in mathematics teaching and learning.

The majority of the doctoral program activities are developed and accomplished over distance. The Center has worked diligently to identify and maintain the most suitable format for their **distance learning activities and courses**. This work has paid off in the form of continuous and tight connections and relationships among doctoral students and between doctoral students and ACCLAIM faculty. Moreover, some faculty have begun sharing with other CLTs and interested parties what they are learning about delivering a mathematics education doctoral program in a distance learning format. The delivery of doctoral-level mathematics courses in this format is perhaps a notable development.

The Center **draws upon top scholars in the field** to advise about its activities, as well as to teach its on-line courses in math and rural sociology/education. The advisory group is very

active and committed, and helps to connect ACCLAIM with the much larger domains of mathematics, rural education, and mathematics education.

ACCLAIM has also made efforts to **connect with other CLTs**, and hosted a conference of all of the mathematics-focused CLTs to share their experiences and findings as well as a distance learning symposium, attended by faculty of other CLTs.

The **Teacher Education Faculty and Pre-service Teacher conferences** hosted by Marshall University have enabled teacher educators and prospective teachers across the region to meet and share their practices. Attendees have found the conferences valuable and appreciated the opportunity to discuss issues of mutual interest with other educators in the region. Moreover, the recent development of a research "pre-session," led by ACCLAIM faculty, brings an important dimension to the practitioners' experience, connecting research to practice. More recently, these connections have been formalized in a sustainable way as the ACCLAIM-initiated AAMTE has become increasingly independent of the Center. It now has its own widely representative board and expanding membership.

Finally, ACCLAIM has made incipient **connections with other NSF-sponsored improvement efforts in the region** – the AMSP, ARSI, and others. Many of these are personal connections, and there are many places where personnel overlap. In sum, ACCLAIM has made substantial progress toward building generative connections and relationships that we predict will exert long-term beneficial influence in the region.

Structures, Policies and Programs

The **affiliation agreement** among the University of Tennessee, University of Kentucky, University of Louisville, Ohio University, Marshall University, and West Virginia University has

made the **doctoral program** possible. Under the agreement, students can take courses at any one of these universities as part of their program, regardless of their official home institution. This affiliation is likely to become institutionalized on some scale after NSF funding ceases. Evidence of this prospect is the recent enrollment of a third cohort of 16 doctoral students, which will enroll in its first classes in the summer of 2007.

The **development and delivery of on-line doctoral math, math education, and rural education courses** has provided the backbone of the doctoral program. For the most part, the students' reviews of these courses – taught by faculty within and outside of the affiliated partner universities – have been mixed. We must note, however, that the distance aspect of the courses has improved substantially as the program has matured. Center leaders continue to develop course standards and other measures of quality control.

"Centerness"

The management team of ACCLAIM, lead by Drs. Bill Bush and Vena Long, has been comprised of scholars from all six affiliated partner institutions. This team, along with representatives from Kentucky Science and Technology Center and a doctoral student, has worked well together to make the major vision and design decisions for the Center.

Centerness has both internal and external aspects. Centerness means creating something more powerful and more coherent than a collaboration or partnership. Internally, the Center is working toward coherency. The affiliation agreement among the participating universities is solid evidence of creating a Center identity that is stronger than the sum of the parts. Additional strong evidence is the report of doctoral students that they feel more like ACCLAIM students than students at their individual institutions.

The Center has strong leadership from two of its largest universities, and they have collaborated to create a leadership that is accepted by the management team and the participating universities as first and foremost representing the interests of the Center. The Center annually reviews and reallocates its funding depending on the need, the opportunity, and the efficacy of its work to date. The Center has used both internal and external evaluation processes to review and revise its strategy, such as adding a university, and altering its practitioner strategy. In our view, all of these indicators point to a Center that has a secure identity and an active intelligence.

Externally, the Center has achieved an identity in the broader domains in which it is working. For example, the Appalachian Association of Mathematics Teacher Educators is a creation that can have long-term impact. The Center's website is in use worldwide, and this has particular implications for the dissemination of Center research.

Prospects for the Future

The Center has accomplished a great deal in five years: it has established a rigorous doctoral training program; produced and disseminated via the web numerous papers and other research products; hosted numerous conferences for regional and national researchers, teachers, teacher educators, and prospective teachers; and fostered a network of regional math education leaders through the Leadership Institute.

In this section we want to raise questions, identify issues, and suggest opportunities with the aim of helping ACCLAIM continue to develop and thrive. There are, for example, questions about the degree to which and the ways in which ACCLAIM students will develop as researchers; there are other questions about the extent to which the "practitioner component" is designed to meet the Center's goals, and whether or not ACCLAIM has fully maximized the

opportunities for participants across the various strands of work to make connections and take advantage of each others' expertise and experiences. There are additional questions about the connection of ACCLAIM with other reform initiatives in Appalachia.

Support for Practitioners

Throughout the years, the Center has struggled with the role and nature of the practitioner component of the Center, which has taken several forms since the inception of ACCLAIM. The Center started its work with a series of Algebra institutes, as some participants argued the need. After a year, the Center leaders made adjustments on the basis of the view that Centers were not primarily in the business of delivering professional development. Rather, they argued that the Center should be building the capacity for better professional development, and that its professional development activities should build the capacity of the Center to do research and educate students.

To date, questions remain as to what the Center ought to be doing with respect to math education practitioners. The Professional Development Teams (PDTs) represented a sophisticated and ambitious concept. The concept of schools serving as the nexus of professional development, teacher education, and research is an attractive idea but challenging to convey, and even more difficult to implement. The plan, however, proved to be a challenging structure for the schools to achieve and for partnering higher education institutions to maintain. While some teams have derived significant benefit from the process, the majority of the teams have made little to no progress. For the evolution of the Center in the post-grant period, the Center's Management Team has decided to focus its energies on the doctoral and research programs (in that order of priority).

The conferences for Teacher Educators and Pre-service teachers have been relatively well-attended, and the participants report that they are a valuable professional development opportunity for them. These conferences could provide a venue for ongoing connection and sharing among the regions' teacher educators, and should be continued. For the future, we note, AAMTE has the capacity and responsibility to sponsor conferences. A priority for AAMTE is to hold Teacher Educator conferences, but the AAMTE board is also considering the need to address pre-service-teachers, either in separate conferences or in a single annual conference.

Our interviews and surveys suggest that the Leadership Institute has proved to be the most fruitful expenditure of resources for practitioners. The potential of this program to build capacity for leadership in the region, and provide ongoing networking opportunities for top math educators is substantial. In the future, we hope that ACCLAIM will discover resources that permit it to include such activity within its portfolio.

In summary, there is no doubt that the development of leadership in the region requires a strong practitioner component. Also, the research aspects of the program need to be grounded in real places and real work, thus making a connection between research and practice realized through the connection with the practitioner strand. We note that in the post-grant period, ACCLAIM is sponsoring a Center-wide, two-year research effort nationwide to study mathematics teachers who are making connections between the mathematics curriculum and their schools' local communities. Roles for doctoral students (including those from other CLTs) are planned, as data gatherers, as analysts, or possibly as dissertation researchers.

Graduate students clearly can benefit from contact with strong practitioner leaders in the region. To date there have been several strong ambitious experiments, and some have paid off. Now, ACCLAIM needs to continue to build on the leadership institute and AAMTE, and to build

better connections between the practitioner components, research and students. The current Center-wide national study is an appropriate start.

Continued Movement Towards a "Center"

Having made good progress over the past five years, ACCLAIM should continue to further promote connections and relationships among its participants on multiple levels and in multiple ways. While connections within groups (e.g., the doctoral cohorts) are strong and remain so, connections across groups could be improved and strengthened.

The key issues we see related to ACCLAIM's "centerness" are:

- Developing the research experience of doctoral students, so that it helps build their leadership skills in appropriate ways, which can then lead them to assume strong regional roles in the future;
- Continuing and further development of the Leadership Network;
- Better connecting practitioners, students and researchers to develop more symbiotic relationships;
- Determining the forms of ACCLAIM that will be continued, and putting them in place now; and
- Finding a way to influence policies at state and even national levels to be more supportive of rural realities, or at least to use ACCLAIM to create a stronger rural voice in policy discussions.

Afterword (by Craig Howley)

The Inverness evaluation effort has concluded. Inverness was at the decision-making table (physically present around an actual table) when important decisions were taken by the management team. The Center's current post-grant configuration is the result, in large measure, of the analysis provided in this paper. It is quite rare for sponsored programs to receive such helpful formative counsel.

The material from which this paper is drawn was prepared in time for use in preparing for the CLT recompetition, which was unexpectedly cancelled in early 2005. The cancellation also had dramatic implications for how the Center management team would plan for the future. While preserving both the doctoral and research strands for the time being, the clear priority in the consensus (unanimous) of the management team was to sustain the multi-institutional doctoral program.

The Center's approach to doctoral education is unique among the CLTs: (1) multi-institutional cooperation; (2) distance education coursework (combined with an intense on-campus experience over 3 summers); (3) a delivery design that permits full-time employment to continue for mid-career professionals; (4) a rurally oriented curriculum (including three courses in rural education and integration of rural themes across the curriculum); (5) emphasis on local service by doctoral graduates, (6) a 50% tuition contribution from students, and (7) a 50% tuition, books, travel, and lodging supplement constituting the only student support from ACCLAIM (substantial fellowships are the norm in mathematics education). We believe there is a national venue for such a program and our third cohort—outside the original grant—has now drawn rural doctoral students from Alaska and California to Maine and Florida.

Mathematics education is a national need and a sharp shortage exists among those who will shape the next generation of classroom teachers of mathematics in U.S. schools. Graduates with doctoral degrees in mathematics education have a choice of three or four positions. One recent graduate from Ohio University, for instance, was invited to four interviews and nonetheless received *five* job offers. The need is particularly sharp among universities located in rural areas, because these are places in which cosmopolitan professionals would rather not settle permanently. Professions are so structured that the greatest prestige and other advantages accrue to major urban institutions.

ACCLAIM's innovative doctoral program has confronted this issue successfully. This doctoral program is frugal, effective in its mission, and extremely efficient. It needs modest support for the future—perhaps $200,000 per year to defray 50% of tuition costs and support coordination for 16 students whose presence on college campuses is a desperate national need. The management team expects that such a clear national need, addressed efficiently and effectively, ought to find support. The search continues, however, as of this writing.

APPENDIX: CASE STUDIES OF INDIVIDUAL ACCLAIM DOCTORAL STUDENTS

ACCLAIM DOCTORAL STUDENT CASE STUDIES (FIRST COHORT)

Brian Boyd

BACKGROUND AND FIRST IMPRESSIONS

Brian is originally from southwest Ohio, just north of Cincinnati, in a town he describes as in "the middle of nowhere." He attended Catholic grade school and high school, and then went on to Miami University where he majored in math and secondary education. His first teaching job was at a small rural high school outside of Dayton, where he taught for two years. After two years he moved to "an affluent school" where he taught math and coached baseball for four years. Throughout his teaching he worked nights on his administrative credential and master's degree in administration at the University of Dayton. He has been a middle school principal for the last two years. He said the following about the transition from teacher to administrator:

> *It has been difficult. I shouldn't say that – it has been interesting. [There have been] a lot of challenges that I just don't know that I am cut out for, mostly with adults and teachers. As I have said to a lot of people, I don't see things a whole lot differently as a principal. When I used to be frustrated with the person next door to me, I would just close my door and do my job, and now I can't do that. I have to deal with those issues that present themselves and find ways to help them, so that is difficult. The kids are great. I had never worked with middle school kids as a teacher, and middle school aged kids are great and I enjoy that.*

In his administrative role in his current district, Brian has stayed close to issues related to math education through curriculum adoption decisions both at the school and district level. His experiences working at this level are what prompted him to return to graduate school and pursue his doctorate through ACCLAIM.

The community Brian's school serves is small but economically more and more diverse. As Dayton is only 15 miles away, his town is slowly becoming a "suburb" of the city. With that brings more white collar families who are concerned about educational issues. At the same time there are many farming families in the community, as well as poorer, blue-collar and single-parent families. While there are few students of color in his district, the neighboring district, closer to the city, is 65% African American.

His major challenge at the middle school is working with teachers who have been at the school a very long time and have little experience outside of the district.

There have been people in the building who have never left the place. They have never been to other places to see what it is like and then had a different perspective on what we do. So when we consider talking about thinking outside the box, and thinking about different ways to do things, and instruction, we can't even begin to have a conversation, at this level, so that has been frustrating.

The first summer in ACCLAIM

His experiences in ACCLAIM have given him new perspectives on the issues facing his district:

I think some of the sociology that we studied gives you a different perspective on why certain things exist, or how they have come to exist. What does the school do to perpetuate some inequities or things that occur in the community? The question is, what do you do with that? I don't know what you do with it, but at least you are aware, you couldn't start to address this without being made aware of it. It will be interesting to go back with that knowledge and experience. I think it has given me a little bit different perspective. I have always been frustrated or mad that more kids didn't graduate from high school. [I have realized that] it is just comforting and it is where they want to be. It has given me a new perspective.

THREE YEARS LATER…

Brian's early interest in the rural issues he learned about in the first summer foreshadowed a theme that has intrigued him for the last three years.

Brian's research interests

As a school administrator, one of the challenges facing Brian is helping teachers embrace standardized achievement exams for mathematics. One of the questions he has about standardized testing is the extent to which well-written test items can actually have a positive impact on instruction. This question has arisen out of both his ACCLAIM work and conversations with his classmates, as well as from his participation on the Ohio Content Advisory Committee that is currently monitoring the development of an 8th grade mathematics achievement test.

He reported that the research to date on this topic relies primarily on teacher self-reports which may or may not reflect the "truth." Brian confesses that this particular research topic does not incorporate the rural context as much as some of his classmates' topics. However he is contemplating attempting to address rural issues by conducting a comparative study of rural vs. non-rural settings and the extent to which achievement tests improve instruction in math. He recognizes that this approach does not "engage"

rural issues the way they have been discussing in the program, but hopes that it will make an important contribution nonetheless. In particular, he anticipates that his research will incorporate ideas and values that he has adopted as a result of his doctoral work:

> *The values [we in ACCLAIM] think are important center on conceptual understanding for students. We try to teach in a way that develops that deep understanding for students that doesn't just focus on a narrow item that is on a test, but gets at bigger pictures. It is the idea that the test is not our only focus, and that good test scores come about because we have done all of the other right things.*

ACCLAIM's influence on Brian

Like all the other doctoral students, Brian indicated that without ACCLAIM, he would not likely be pursuing graduate study. Indeed, he described his summers with his classmates as a unique opportunity to become immersed in work that he would not have time for otherwise. He explains:

> *The summer has been great in terms of being away, and it is hard to be away from family, but at the same time, I got to really get into it. I got to take hours at a time, and sit in the middle of my floor with all of those articles and try to piece them together. I wouldn't have been able to do that at home, get deep into it, get immersed into it. The other important part is I have been able to keep my job. I wouldn't be here otherwise. I wouldn't be able to. That has been important.*

Brian reported that the coursework and connections within the cohort and across the Center have proved to be much more powerful and valuable than he initially imagined. For one example, as part of his internship requirements, Brian facilitated a course through his local county office based on the book The Teaching Gap. This was his first attempt at teaching a course that was not math content-based, which he found extremely challenging but also very rewarding.

Most profound, however, has been Brian's evolving understanding of and appreciation for the significance of the rural context. Specifically, Brian has come to see "rural" as more than simply a setting, or a context from which people come or within which people work and live. For Brian, rural represents a deep commitment to place and relationships, as he explains:

> *I think that whether it is school consolidation, or other things that people talk about regarding the need to improve these small rural schools because they don't have these opportunities for kids, they operate on the idea that there is something wrong with being a small rural school. They assume that small rural schools don't have as much, and that may not be the case at all. There is value in being a small school, being a small community, being*

> *inter-dependent upon each other to survive, knowing everybody around you and choosing not to leave that place. There is value in that, and I had never thought of that. I came from a place where I really didn't want to go back to and teach, and now I have come to appreciate that doing that would be kind of neat. And the issue of how schooling has taught kids to want to get out of their place, that the grass is greener somewhere else, and that they really haven't accomplished anything unless they have left, is just perverse.*

Brian reported that these and other issues related to rural matters in schools and teaching have been the most powerful and influential on his own thinking, both about potential research and his current work context. He still struggles with what "rural math education" means, and how to tease out the ways in which traditional math reform efforts and the rural issues "pull" on one another. He sees the mission of ACCLAIM as trying to untangle and understand better these issues.

Brian's new-found appreciation for rural has extended beyond his course work to cause him to rethink his own identity as an educator. He reported that he entered the program as a way to begin on a path *out* of the principalship. While moving between the world of ideas and the academy and the imperatives of running a school have been difficult – sometimes "schizophrenic!" – the experience has also raised questions for him that he would like to work on in the future.

> *I recognized the importance of that role, of being a principal and that I have the opportunity to really help people from that perspective… I think I can continue to be a principal and this program has helped me see bigger pictures in education and specifically rural education. …This program helps me do that job better and recognize the importance of that job and some of the different aspects that I have not thought about before in terms of really making the school an extension of the community or involving the community in the school.*

<u>Rural math education leadership</u>

As stated above, Brian's current thinking is that there is a sense in which his current job is not finished; he feels there is work he can do as a principal to improve teaching and learning. For Brian, leadership in this domain is slippery: Can one study to become a leader? Are leaders made, or are they born? He doesn't hold the answer, but does believe that ACCLAIM has provided experiences and opportunities that have contributed to his (and his classmates') growth as a leader. He explains:

> *I don't know that you develop leadership explicitly by focusing on it. But I think the experiences [in ACCLAIM] have done that. I think they have increased our knowledge-base in mathematics and in mathematics education and in rural education. I think we know a lot more, and I think that we recognize that we don't know as much as maybe we thought before, that allows us to step back and say I need to listen a little bit more before I judge anything. We have had a lot of experiences that have helped us be more reflective, be more knowledgeable about the many issues that exist in math education and in rural education.*

In particular, Brian counts conducting an original research project as central to being a leader in this field. He voiced some concern that the ACCLAIM program had not involved the students in research as much as a traditional program might. Regardless, he sees ACCLAIM as filling an important role in creating math education leaders in the region.

AFTER ACCLAIM

As described above, Brian expects that he will remain a principal after all, at least for awhile. He does not, though, discount the notion of becoming an education professor, or continuing to do research. He spoke of the possibility of conducting practitioner research in his school setting, perhaps in collaboration with a local professor. Most important to Brian is making a meaningful contribution to the education of teachers and students, wherever his home may be.

ACCLAIM DOCTORAL STUDENT CASE (FIRST COHORT)

Barbara Buckner

BACKGROUND AND FIRST IMPRESSIONS

Barb was born in Detroit, Michigan but moved to Bland County, Virginia – her parents' home – when she was three years old. Her family continues to live in Bland County, in a town called Rocky Gap. Barb describes Bland County as "truly bland," and her parents as "just hometown folk." According to Barb, "there are no stop lights in the entire county, and everybody knows everybody." Barb's grandfather and two of his brothers married three sisters, and all lived within one mile of one another. She recalls always having at least one cousin or some other distant relative in every grade in school growing up.

Like a few of her ACCLAIM classmates, Barb went on to earn a masters degree after college. At Lee College in Tennessee, Barb earned her bachelor's degree in mathematics, and her master's in education at Tusculum College. She has been teaching science and math at Bradley Central High School in Cleveland, Tennessee for the past 11 years, as well as computing classes at Lee University. Throughout her college and teaching years, Barb has traveled all over the world, with several trips to the Ukraine. These trips were associated with Lee College.

Barb has had several significant mentors over the years who have strongly encouraged her to pursue post secondary studies. She recalled that at her ten-year high school reunion, she was the only person with a bachelor's or master's degree. Her lifelong dream had been to become a math teacher and come back to her hometown high school and teach. She remembers her math teacher asking her to help out other students in the class, and once, when he had to miss school for two classes, asked that she teach the classes!

<u>The first summer in ACCLAIM</u>

By the end of the first summer, Barbara felt quite confident that she had made the right decision to join ACCLAIM. She had already found some of the materials she had learned in sociology class to help students understand issues around a change in administration at her school. She also felt that even after just a few weeks with her classmates she felt motivated to be a better teacher:

> *Being with the group of teachers that I have been with has raised the bar. It has challenged me to be better. Who you hang out with is what you become. When you hang out with a*

> *bunch of high school teachers who have no desire to improve themselves educationally, teaching-wise, methods-wise, relationships-[wise] – you get stuck in a rut.*

By the end of the summer, Barb felt prepared to jump into the ACCLAIM experience with both feet.

THREE YEARS LATER…

Barb believes that ACCLAIM has added tremendous value to her life – both personally and professionally. She spoke of her cohort as family, and of the contacts she has made and the experiences she has had as "off the chains." She continues to struggle, like many of the doctoral students, with defining her research topic. However this does not worry her – she is confident that with the support of her cohort and ACCLAIM faculty, she will succeed.

Barb's research interests

Not unlike her classmates, Barb has faced some challenges identifying her area of research interests. One of the most challenging tasks for a new researcher is coming up with a researchable question that will add insight to the knowledge base. Barb has wrestled with this over the last year or so. She has a sense of her general area of interest – technology professional development in rural schools. But the feedback she is receiving from her advising professors tells her that her focus is much too broad and that she needs to narrow it.

Last summer, she wrote a literature review that explored the intersection of mathematics professional development and technology. This assignment helped her realize that she will not only need to narrow her work to a specific technology – like calculators or PowerPoint – but also the context of the study (the classroom? professional development?) and the research methods she will use. Her current idea is to study calculator use in the classroom.

ACCLAIM's influence on Barbara

Barbara has taken advantage of the internship requirements in ACCLAIM to engage in activities that she would otherwise not have access to. For example, she wrote and received a $20,000 grant for her high school to create an integrated curriculum that included vocational education. Upon receipt of the grant, the granting agency asked her to be one of four speakers (out of the 18 grant recipients) to speak to over 100 vocational educators about the project.

Even though Barb has attended numerous regional conferences in the past, she claimed that through ACCLAIM she has a "greater appreciation" for these conferences, and has

been more motivated and confident to present at these conferences herself. At the time of this writing, Barb had presented at the Smokey Mountain Math Teachers Association meeting, and had plans to present at the Tennessee Math Teachers Association.

As all of the students have testified, the greatest value added of ACCLAIM to their graduate education – aside from the cohort and the "instant community" it provides – has been the access to experts around the country in mathematics, mathematics education, and rural education and sociology. She explains:

> *I think ACCLAIM has been great in terms of connecting us to people, whether you look at the [ACCLAIM research conference in Ohio] and that opportunity, or take a look at the instructors we have had. If I were at U of L doing this course, there might be 10 different people that would teach me, but that would be all of U of L's 10 people, whereas with ACCLAIM, we had four teachers this summer, but we also had five outside guest speakers. We have had nine this summer alone, and five of those are international.*

She went on to comment about the advantages of a multi-university program:

> *The ability to go from different universities and to see the different things that are available has been great. I know what Tennessee has available, and I know what Kentucky has available. I was looking for one particular thing [for my research] and I remembered where I had done research in Kentucky last year. I had learned how to navigate their system, and so I went back there. I also went another avenue with Louisville and I got two totally different groups of information. If you are only accessing one community you might not get that. On top of that, the research that ACCLAIM is doing in Ohio, they've got great stuff online.*

In addition to the resources ACCLAIM brings in the way of people, ideas and tools, Barbara also emphasized the importance of the personal connection among and between the students and the core ACCLAIM faculty, and the sincere feedback she felt they received from one another. She recalled a recent meeting between Dr. Bush and five cohort members who are getting their doctorates at the U of L:

> *Dr. Bush sat down with the five cohort members from U of L, and he said: "You guys have changed tremendously, and learned a lot. You need to hear me, I am confident that all five of you are capable and able to see this through." That was a lot coming from him. You think I can make it! That was a big statement. And he didn't just flippantly say it, but it was 'make sure I have your attention here, make sure you hear what I am saying.' We are not here by accident.*

Finally, Barb feels that even though her recent foray into the research literature did not help her make much progress in the direction she thought she was heading, she nonetheless knows that it was a valuable experience and that she will be able to complete her research project because of the emotional and intellectual support she receives in ACCLAIM:

When I finished with my conversation with [my professor], I decided to take my lit review and throw it away, because I am going in a different direction. I am okay with that because ACCLAIM has empowered me, I know what I am doing now. I feel like I have discovered a way to be successful.

Rural mathematics education leadership

Like her classmates, one of the issues for Barb about becoming a leader in rural math education is defining and understanding the meaning of "rural:"

I think what [ACCLAIM] has challenged me to do is look at the definition of rural, and how that definition has changed. There are so many different definitions of rural out there, that depending on how you do the research and what definition you use, it can still be tainted. So often we are asked to define rural, and I think that is part of the problem – rural is not defined, clear and concise and something that is going to fit clear across America. I think we could probably come up with a definition of Appalachian rural. That might not be a bad idea for ACCLAIM to tackle as one its goals, not to necessarily define rural, but to define, what does it mean to be Appalachian rural?

Absent a clear definition, Barb still believes that she will always look through a rural "lens" in her work:

…[ACCLAIM] has provided us with a whole toolkit related to rural issues to use with our teaching, whether or not we do it in research. …[ACCLAIM] is sending us back out there, and regardless of whether we teach rural education, or whether we do research on rural education, or whether we go back into the rural community, the fact of the matter is we have the sense of "ruralness" that is going to be there.

Another dimension of leadership for Barb is "making a difference," impacting the lives and work of the people in one's community. Her experience writing and receiving the grant to create integrated curriculum at the high school was for her a small thing to do with a large impact. She explains:

All I did was take five or six hours to write the grant. It is great to be able to do something like that and make a difference. You get people to think about cross–curriculum integration, and that is exciting to me. I would like to move into professional development. I think in some ways, ACCLAIM has been professional development in that it has energized me to teach and make a difference and to remind teachers that that is what it is about.

Finally, all of the internship activities and opportunities to tap into a variety of improvement approaches – on both a theoretical and practical level – have contributed to Barb's growth as a leader in the region.

AFTER ACCLAIM

Barbara is a teacher through and through. No matter where the future takes her, teaching will be her core activity. ACCLAIM has helped her to become recommitted to mathematics teaching, which wasn't exactly what she expected when she applied to the program, as she explains:

> *I don't know that I started this process with a goal beyond getting the degree. I just felt like this was something I was called to do and complete, and I have been given the gifts and talent to do so. But from the first summer, ACCLAIM gave me a rekindling of my love for math. Part of that is being around the group of people who enjoy math, and part of it is having someone like Dr. Lee who challenges you to think about math in literally a whole other dimension, math in the 4th dimension. It was intriguing. Math was intriguing to me again, and it had been awhile since I felt that way.*

Barb doesn't feel constrained by subject matter, though. She feels teaching is her calling, and no matter where she is, it is her first priority:

> *Whether a cohort member needs help with a PowerPoint, or a kindergarten kid needs to learn how to tie his shoe, I think in my understanding of 'teacher,' it is 24/7/365 – it doesn't stop. With that title comes responsibility. My whole purpose of being here and being involved in this is to make me the best teacher I can be, and whether that is in the classroom, in the college classroom or behind the podium at a conference, or in the library researching. I think all of that is encompassed with being a teacher.*

Barbara hopes that in whatever direction she goes she will be in a position to make a difference. She realizes that her goals might not be attainable as a classroom teacher, and so is open to the possibility of other leadership positions, as she describes:

> *I don't know that I want to be a principal, and I don't know that I want to be a superintendent, but I don't think that I could create the systemic change that I would love to see just being a high school teacher. … I could go back and give back to the little small, rural, Bland County that I am from. I don't have the certification to be a principal and I don't know that I would have the certification to be a superintendent, but at the same time, I could see that being a possibility someday.*

Moreover, making a difference and giving back also includes research, and that can't easily be done from the classroom either.

> *ACCLAIM has taught me that as a professional, number one, I have a responsibility to give back. I know that as a teacher, but I have never looked at it in a researcher capacity. Now as a high school teacher – and I guess this is the part that begins to stretch me – do I have the avenue to go do that research? The answer is no.*

Nonetheless, Barb is committed to "finishing what she started" at Bradley High School, and with her doctorate feels that new doors in mathematics education will open eventually. She believes ACCLAIM will have prepared her well for whatever the future holds, wherever that may be.

ACCLAIM DOCTORAL STUDENT CASE (FIRST COHORT)

Craig Green

BACKGROUND AND FIRST IMPRESSIONS

Craig Green was raised in rural Maryville, Tennessee, not far from Knoxville. He attended very small schools where academics were important, but he remembers that the highest status was conferred to the athletes. After graduating from high school, he attended the University of Tennessee in Knoxville, which presented a number of challenges for him, not least was moving from a small, rural school system to a very large university. As he put it, he had to "overcome a lot of personal things like shyness and…for awhile it was pretty rough."

He started college as an accounting major, but quickly discovered he "didn't really like chasing beans much." He realized instead that he enjoyed working with children, and decided to move to education. While he initially wanted to pursue the study of history and teach that subject, he was advised against it, and returned to his quantitative roots in mathematics.

Craig's community

Craig has been teaching math at Copper Basin High School in Polk County, Tennessee for the past 22 years. Not unlike many communities in the region, the community within which his school resides has undergone gradual but significant social and economic change over the last several years. Due to the closing of a copper mine and chemical plant, the economic realities of the county have shifted drastically. As Craig describes it:

> *In my county, [the mine and plant were] generating over a million dollars worth of taxes… and then all of a sudden it dried up and left, just like Dr. DeYoung was talking about – the extraction industry. When they decided to close the mines, they closed a lot of things in town and went from about a million dollar tax revenue to about $50,000 within five years. The impact was tremendous. The student body changed. I used to teach the kids of engineers, and the majority of the parents had some type of college education. Now it is rare. I think the rate of people who have a high school diploma is now around 50%, maybe even less. So that was a dramatic change if you looked from one end to the other, but it is such a gradual change, you really didn't notice it.*

While Craig loves teaching and his job at Copper Basin, he feels the changes have made life more difficult there. He referred to the current state of his community as "backwards progress." Indeed, he described Copper Basin, where formerly there was a

barren landscape where mining once took place, as undergoing an effort to bury the past:

> *The area itself has changed physically, because it used to be barren hills. Everything was denuded, but that is what Copper Basin was famous for: there was no vegetation, almost like a desert. And now, we are healing by covering up the past. You would think if someone is studying their past, they would dig things up. Well, we are trying to improve I guess by burying it. We have an environmental cleanup company that has moved in and has signed off on agreements with the EPA and Tennessee State Department, and they are voluntarily cleaning things up. We are removing and covering, and that is sort of strange. We are going to lose the majority of our past, but it is for our future.*

Craig's students

Besides the occasional typical problems with drugs and alcohol in the area, Craig's students are pretty average teenagers. When the plant and mine closed, parents were required to travel up to 60 miles away to find work, but they would rather travel than move out of the community. Most of the students do not consider college, but do see graduation as an important goal. In terms of the college aspirations of his students, Craig explained:

> *I would say, about 40% intend to go [to college], about 25% fill out the forms to go, and anywhere from 15% to 20% actually do go. Only about 10% go back in the winter, and maybe a little bit less than that actually get a degree.*

Additional issues that Craig's community faces include the transient nature of a large segment of the population; families who move almost month to month, unable to pay the rent. Craig also speculated that nearly one-fourth of his students live with either just one parent or with their grandparents.

Craig's first summer in ACCLAIM

By the end of the first summer, Craig was still finding his place in the ACCLAIM program. A painfully shy individual, Craig had some trouble expressing himself, and spoke very softly, if not inaudibly. He noted that while he is grateful that he can keep his job and study at the same time, the summers away from family and community are difficult. He also worried about going back to his school community and not being able to communicate what he has learned to his colleagues. However he looked forward to further work with the ACCLAIM cohort, as well as "improving connectedness" among his school colleagues.

THREE YEARS LATER…

By the end of the third year in the doctoral program, there was a noticeable shift in Craig's confidence in his ability to move through and between the worlds of high school teaching and academia, as well as in the facility with which he articulated his ideas about research and its role in his professional life.

Craig's research interests

Through his work in ACCLAIM courses and conversations with his classmates, colleagues and mentors, Craig has become increasingly concerned about the extent to which rural areas – such as his own – are losing their identity and sense of place. He wonders about this situation, and wants to find out whether or not a place-based pedagogy in mathematics can turn this around.

> *My setting is a rural area, and the achievement levels are not that great. We have lost our community and school connection. I have always thought that the schools in small rural areas should be the crown jewel, where everything evolves, but ours has lost that. I am interested in doing some type of research that looks at place-based pedagogy… There seems to be a lot that I read where everybody has a good feeling about it, but no one has really done empirical studies on it.*

His idea of "place-based" mathematics is still forming, but in essence it embraces the hypothesis that a subject like math can be more compelling to learners if context is given as much play as content. In Craig's words,

> *If you are interested in something, you will learn it, and if I am able to weave the mathematics content into the community context, I think that somewhere, I am going to find an entry point for, if not one of my students, most of the students. It also gives me an option of not just teaching it one way, but many different ways, especially the way the student is interested. …It is getting your community, your environment, your place into your classroom or vice-versa, take the classroom to your environment. …I think it is easily transferable to the math, because you will be using mathematics as a vehicle to analyze things from your community.*

He anticipates that critics of this kind of math teaching will point to the problems – both political and logistical – of trying to personalize content for individual students. However, he believes that standards and assessments and place-based math can be woven together:

> *If you incorporate the individual, that child is not left behind. But if you just do the standardized testing, you are going to leave a lot of children behind. I think [place-based teaching] is a good way to weave these national needs together. Place-based [has the potential to] weave the school into the community and vice-versa.*

ACCLAIM's influence on Craig

Craig was quite certain that if it were not for ACCLAIM, he would not be pursuing a graduate degree. Craig is *the* math department at his high school, and without a close-knit group of colleagues that the cohort provides, he fears he would not have survived. As an isolated teacher in a rural school, he has become adept at self-reliance and hasn't tended to seek out assistance or feedback. Being an integral part of a cohort like this has opened him up to an entirely new way of working, as he explains:

> *I have learned from the ACCLAIM cohort to talk about things, to work together and compliment one another. We always talk about the fact that some people have strengths and some people obviously have weaknesses, and when we have a problem we sort of band together and help each other out. We don't do each other's work, but supplement and point each other in a direction. Sometimes it is just a matter of sitting down and having somebody to talk to. I don't think I would have gotten that at UT or any other institution if I were doing this on my own. I really couldn't trust somebody to be a sounding board. With the cohort, I think it is understood that today may be my time, but tomorrow will probably be yours as far as needing to work something out and get some help.*

Moreover, he is extremely grateful for and impressed by the quality of the people the Center has been able to attract to work with the students. It has been the input, encouragement, and passion of these people that has inspired Craig to pursue his current interests.

Rural mathematics education leadership

Craig identifies himself "according to the place I am in at the time." As an ACCLAIM student, Craig sees himself as pursuing the role of professional mathematics educator. He confesses he did not intend initially to be a teacher educator, but understands now that this is one of ACCLAIM's goals – to prepare future leaders in mathematics teacher education. Further, he hopes to become more knowledgeable through research and, and to "spread the gospel of ACCLAIM," which he believes is the connection of mathematics to the community.

Craig is also solidifying one of his key prior beliefs that to be a good teacher, one has to "be political." He explains:

> *I think you have to [be political] and if not, you are always going to be pushed around. Anything that works for your area will be overlooked for the thing that everybody seems to be pushing at that particular time. Or the politics can change overnight because you have an election, and that new person can say,' we are no longer going to do it this way, we are going to do it that way.' The problem is, the new way may not be the best fit or it could be a perfect*

example of what you are trying to do. You have to understand that [being rural], maybe there is a difference, and it deserves a look.

In addition to finding a stronger, political voice, Craig also has become convinced through his ACCLAIM experience that the isolation of teachers in rural schools must be addressed somehow. In the absence of interaction with colleagues, teachers tend to "look to the end:"

It is so isolating that you are just looking to the end and not the in-between. In other words, you hear teachers say, "Well I got five years before I am going to retire," and that seems to be the end. That is the purpose, they are just trying to survive, but [through the] ACCLAIM program [I have learned] you are never finished.

His inspiration for this insight has been his advisor Dr. Vena Long, who, after many years of productive work in numerous capacities, seems to have endless energy and time for new projects like ACCLAIM. Craig said he feels honored to be "passed the torch" by Dr. Long.

Finally, Craig believes one of the most valuable benefits of being a student in ACCLAIM (as opposed to a traditional doctoral program) is the access students have to national experts in rural and math education. An astute student, Craig has deduced that who one knows, matters. He explains:

At the very beginning, I think [having professional connections] was a thought that was given to us. The idea was it is not so much your research, but who you find and know and make connections with. I didn't quite understand that the first year, or the second year. But in this third year, that idea seems to be coming to life, as far as opening doors and making connections. It's not that you personally know this person as your good buddy, but [ACCLAIM] makes the person more open to you and you do have a connection, at least you have a commonality that you can talk about.

AFTER ACCLAIM

After the program ends, Craig plans to stay at his high school and help implement a program that involves his school in the environmental clean-up effort in his community. This engages the school and community in documenting and discussing the changing landscape and rejuvenation of the local watershed. External resources will be brought in to help educate the community about the social and scientific aspects of the ongoing transformations. Another large component of the project is the collection of photographs of the community over the years, incorporating family narratives.

While the math components are not clear to him yet, it represents the kind of contextual learning that Craig thinks can bring communities such as his closer together. While he is eligible for retirement in five years, he says it's too early to say what the future will actually bring. He feels confident that ACCLAIM has equipped him with the skills and knowledge to make a new kind of contribution to his school, as well as prepare him for whatever lies beyond "retirement."

ACCLAIM DOCTORAL STUDENT CASE (FIRST COHORT)

Christie Perry

BACKGROUND AND FIRST IMPRESSIONS

Christie Perry grew up in Williamson, West Virginia. She graduated from Morehead State University as a math major, where she also met her husband. She got married at the end of her senior year, and moved to Bath County, Kentucky where she lives today.

The major industry in Bath County is tobacco farming. About 20% of high school graduates go on to college. They are "not motivated to get a good education" – Christie believes motivation (or lack thereof) "comes from the homes." In her daughter's high school class, 163 started, 89 graduated, 15 went to college, and five graduated from college. Most students, if they graduate from high school, go on to take local jobs at the Dairy Queen, in construction, or on a farm. To address these challenges, the school houses a family resource center that "tries to help remove barriers to learning."

Prior to becoming a teacher, Christie worked at a bank. Unhappy in her position, she took graduate education classes and did her student teaching to obtain her teaching certification. Her first job in Bath County was teaching primarily migrant students who were part of a "pull out" program. After three years, she transferred to a K-8 school where she taught 7th and 8th grade math. After the county consolidated the schools, she transferred to the newly-formed middle school where she taught 8th grade.

She was very happy in that job, and participated in a middle grades math teacher network facilitated by Bill Bush. Her teaching changed to include more and more "hands-on" mathematics, and she became very comfortable with that approach. However, she had always wanted to experience the high school. And, in one year, all four math teachers at the high school retired or took a job elsewhere. Coupled with the fact that her daughter was moving to the high school and she was concerned about her math experience, she decided to switch to high school teaching. Once at the high school, she realized how much higher-level math she had forgotten! Because the entire department was brand new to the school, and Christie had the most experience, she was named department chair.

In her first year at the high school, she taught five different courses, including pre-calculus. She struggled with the content and was frustrated. She had grown to enjoy a standards-based, hands-on approach, which was not possible to do at the high school. Just when she started to put her courses together, she was offered release time to be an

ARSI teacher partner[1]. For ARSI, she conducted professional development for all math teachers in the county. Through this position she worked with every 3rd and 4th grade teacher in the county.

Christie went back to Morehead to get her Rank 1 certification in 1990. At the time, she considered other options – a Ph.D. or master's degree -- but could not afford to quit her job. She heard about ACCLAIM through ARSI, and with three years left before retirement, she thought the timing was right to go for the Ph.D. She doesn't see it paying off for her monetarily; she sees it more as an opportunity to "increase her options," whatever they may be.

The first summer in ACCLAIM

After the summer ACCLAIM program, she began to see more clearly the benefits of her experiences with ARSI. She began to understand better the uniqueness of the rural setting, and thought about ways her new insight could assist her district. She also gained a better understanding of the reasoning behind some of the KERA (Kentucky Education Reform Act) initiatives. She felt ready to move onto the next phase of the doctoral program.

THREE YEARS LATER…

A 26-year veteran teacher, Christie took on the challenges of ACCLAIM with a certain amount of trepidation. About a year and a half into the program, she truly wondered whether or not she would finish; she admitted that she took it one semester at a time. Her plan had been to retire after one more year in the classroom. However, through a variety of internship experiences, participation in several conferences and meetings, and her interactions with her cohort and ACCLAIM faculty, Christie has emerged with a focus and commitment that was even surprising to her.

Christie's research interests

Christie initially thought she would study motivation for math learning in students. However, after discussions with ACCLAIM faculty and her advisor at U of L, she has decided to turn her attention to teachers. At the time of our interview, Christie was not sure what direction this new focus would take. She may try to translate her interest in student motivation to the teaching context. Christie wonders if motivation for math learning is different for rural students, and if so, how? As part of one of her courses in rural sociology, Christie learned that some research has shown that rural people, psychologically, tend to live more in the present than in the future. What implications might this have for students who don't tend to be competitive, for example?

[1] ARSI, the Appalachian Rural Systemic Initiative, was an NSF-funded rural systemtic initiative grant that served several states in Appalachia to improve k-12 mathematics and science teaching.

ACCLAIM's influence on Christie

Like the others, Christie highly valued the myriad opportunities through the internship, such as grant writing, publishing on the ACCLAIM web site, attendance and presentations at a range of regional and national conferences (i.e., AMTE, KCTM, NCTM), and a research project with the Appalachian Math Science Partnership.

In particular, the opportunity to be part of the ACCLAIM group at the NSF Principal Investigators' meeting in Washington DC during her first year made a tremendous impact on her, as she explains:

> *Going to Washington really impressed me. I realized there was a whole other layer of people involved with education. I was just a teacher in the classroom, and didn't even realize that these people existed. Yet, they are the ones who are impacting what goes on in my classroom. That was eye-opening.*

Christie believes that the most influential aspect of being in ACCLAIM has been the exposure to rural issues in the rural sociology courses offered by her program. She said that in the beginning, she thought of herself as very focused on the math content and the math education issues, and wasn't sure she would gain very much from the rural aspects of the program. However, at the end of the first summer, she stated:

> *I had never looked at rural as being different. I have never lived anywhere else, so I didn't realize there were separate issues. But from the things we've been reading, I can see the reason behind some of the things KERA is doing, like site-based councils, family centers, and resources centers. It all makes more sense.*

Later, she expressed an even deeper commitment to the importance of the rural context in her program and in her own teaching and future work:

> *I came into the program, math ed, math ed, math ed, and now it is the rural sociology stuff that interests me more. At one time our joke was we complained about being required to have rural [issues in our dissertations]. At the Castle I was talking to Craig Howley, and told him that I was going to ask Dr. Bush if we had to have the math! I just got an entirely different perspective on rural. I guess I grew up with the deficit model in my head and [ACCLAIM helped me to see] a different perspective. …I could almost become an activist about these issues…*

Rural Mathematics Education Leadership

During the first three years of ACCLAIM, Christie took on new roles and engaged in a variety of activities that involved leadership. For example, during her second year, while still an ARSI Teacher Partner, she became involved with the Appalachian Math

Science Partnership as a mentored intern – visiting and mentoring teachers who had participated in AMSP[2] workshops. Through all that, in addition to her conference presentations and website publication, Christie still sees herself as a teacher – but with a new qualification: a rural teacher. She explains:

> *I still consider myself a teacher, but I consider myself a rural teacher. I need to focus more on rural issues in my teaching. Of course, I have been out of the classroom for four years. We take our students in rural areas, and we tell them to get a good education so they can go somewhere else and get a job. I have done that, and that is not going to happen anymore. When I say focus more on rural, I mean find ways to motivate them to learn, no matter what they decide to do, no matter where they decide to go. It is a really different perspective and it makes so much sense. But I can remember, I was still at Salt Lick Elementary when one time I must have said something to a student like that. I remember this fleeting thought that, gosh, if they all took my advice, there would be nobody left! But I never thought there was a whole group of [researchers and others] concerned about that.*

Christie's work in ACCLAIM and connection with ARSI and the AMSP have provided her with opportunities and experiences that have contributed to her growth as a leader and a scholar.

AFTER ACCLAIM

I am starting a whole new career.

As mentioned, Christie was expecting to retire – getting her Ph.D. was not always part of her plan, but seemed to come at a time when she was most able to devote the time and attention to it. Unexpectedly, in the summer of 2004, Christie was offered a job teaching mathematics to elementary teachers at Morehead State University, her alma mater. For her, this offer was too good to be true. With her renewed commitment to rural education, and the support of ACCLAIM behind her, she decided to accept. She started in the fall of 2004.

Christie has been "dabbling in leadership through ARSI, AMSP, and other opportunities for the last several years of her K-12 teaching career. ACCLAIM added a new dimension to her thinking about rural settings and built upon her solid base of commitment and motivation.

[2] AMSP, the Appalachian Math Science Partnership, is an NSF-funded Math-Science Partnership program serving several states in the Appalachian region.

ACCLAIM DOCTORAL STUDENT CASE (FIRST COHORT)

Karla Willis

BACKGROUND AND FIRST IMPRESSIONS

Karla was born and raised in Richmond, Kentucky. She continues to live in Richmond with her husband and small son. Karla majored in business at the University of Kentucky and worked for eight years in banking. During her banking career, she served as a school board member and realized that to make the kinds of changes in classrooms she thought were important, she would have to be a classroom teacher herself. Once in the classroom, she realized she could be even more effective in a leadership position, which led her to pursue and earn her administrative credential. For the past two years, she has been conducting professional development for elementary teachers in mathematics. She has also taught mathematics methods courses at the university level for pre-service elementary teachers.

Currently, Karla is teaching Kindergarten at a local school in Richmond. This is a new position for her, which she was prompted to pursue as a result of learning more about ways high-needs schools and children are characterized. Prior to this job Karla taught 2nd grade at a Model Laboratory School on the campus of Eastern Kentucky University (EKU), which served a very different (i.e., more affluent and less diverse) population. She explained her move this way:

> *I was exposed to the research and some of the information about what children in rural and urban settings can and cannot do, what they have and don't have. It made me want to change [job contexts] and see what I could do in a different situation. It has been very fruitful for me and I hope for my students.*

Although Richmond as a community holds potential opportunity for many people, Karla recognizes the social stratification that exists and the lack of supports in place for those on the lower end economically. EKU is the largest employer in the county, along with the school district.

To achieve her leadership goals, Karla believed that a doctoral degree was the necessary next step. After her time in the classroom, receiving her principal certification, and several brief opportunities to conduct professional development or teach at the university, Karla saw her next step as obtaining the necessary knowledge, skills, and certification for new leadership opportunities.

The first summer in ACCLAIM

Karla felt comfortably challenged by the first summer of courses. The math in particular challenged her, and she realized that her math knowledge was a concern among the project leaders. She had bonded with the current cohort and felt that the level of challenge was just right along the other dimensions of the program.

THREE YEARS LATER…

Karla created a home for herself within ACCLAIM. Her commitment to helping all children learn math has deepened, and her participation in a range of ACCLAIM-sponsored activities has resulted in tremendous professional growth. Like a few other students, Karla will need to take additional graduate level math hours to fulfill the requirements of the program.

Karla's research interests

Karla has completed nine years as an elementary teacher with a special interest in mathematics. Her experience has taught her that for teachers to continue to improve, new structures for professional development need to be invented and implemented. In particular, structures such as lesson study, or other study group formats hold great promise, in her view. For her research, Karla hopes to implement a lesson study-like program for teachers in her current school and study the effects on teachers (or students, but mostly she is interested in teacher impact.) To address the rural question, Karla has considered studying such a program in an urban setting and a rural setting, with the focus of the research being the different themes or issues that emerge between the two.

In addition, Karla is interested in elementary teacher preparation in mathematics and would like her work to somehow address the content knowledge of elementary teachers – she has questions about how Appalachian universities are preparing rural elementary teachers in mathematics. Further, she wonders about the extent to which teachers trained in Appalachian universities return to their home towns to teach. In other words, what does the landscape of rural (Appalachian) elementary math education look like?

Over the summer, Karla convinced her new principal to order a copy of The Teaching Gap for every teacher in the school. She hoped that she could lead a discussion group about the book when they returned in the fall.

Karla envisions all of these questions as being central to the mission and goal of ACCLAIM to build mathematics capacity in Appalachia, particularly through the

development and strengthening of elementary teachers' content and confidence in the content area.

ACCLAIM's influence on Karla

Like the other students, Karla praised the internship as providing opportunities to participate in activities that she would otherwise not know about, or would not have the confidence to attempt. Overall, though, Karla explained that the math content she has learned so far in ACCLAIM has had the most impact on her work and sense of self:

> *In my current school, if my kids ask a question, or if something comes up about the math in the building, I have a little deeper understanding of the math that is involved. I am giving answers that are stronger than they probably were before. I have more confidence, and my vision of math has broadened. I have a lot more to pull from as far as making connections.*

Second to her enhanced knowledge and confidence in math content, Karla reported that the connections she has made through attending ACCLAIM conferences, and her participation in the PI meeting in Washington DC, as crucial to her development as a math education leader. She recalled a particular example of a visitor whose work influenced her – both intellectually and emotionally:

> *Last week, Dr. Porter (an anthropologist) talked about how she travels to different countries to study education. She had a video of where she had gone in Peru to build a pre-school, using her work as a kind of mission. That just hit me right here. Because you see, my community has so many needs, and education is the key to help a lot of kids. And mathematics is part of that education. So, meeting people who use their work to do different things has made a big impact on me.*

Finally, Karla has taken in and personalized many of the messages she has picked up over the last few years. ACCLAIM has compelled her to take on new challenges, to want to be better and learn more. She describes it this way:

> *I go back to the messages that I have heard from different people, and the one that most sticks with me is the question: What is education for? Words like community and stewardship – I hear those words come around a lot from speakers. I catch them every time I hear them. Certain things really stick, and those kinds of words stick with me. Whether it is rural or a small town, I think those things are important – how people build each other up, and help kids who need it. It is about what you do to make sure that they have the same opportunities that other kids have, no matter what.*

Rural math education leadership

Karla feels quite certain that her participation in ACCLAIM has "broadened and deepened" both her knowledge of mathematics and her commitment to improving her community through education. She said, "I can go back to the mission of what education is about and what community is about, and ACCLAIM has deepened what was already there for me and made the drive stronger." She said that the other cohort members tease her – "Karla is going to save the world!"

In addition to math knowledge and passion for improving the lives of others, Karla believes that one of the values of ACCLAIM, and important to leaders in the field, is the problematization of "rural" – something she thinks every one of her classmates has struggled with since the beginning. At the time of our interview, she stated her understanding of rural this way:

> *It has made us more aware that rural is a culture. As far as mathematics education is concerned, you need to address that culture along with the math. Math is not this universal science taught in a universal way: you need to look at those who receive it and make it work where they are. It is not dumbing-down the curriculum, it is not making it different. It is just making a difference, and making it more relevant, instead of taking what someone else says it is. It is making it work.*

AFTER ACCLAIM

Karla believes that ACCLAIM is providing her with the necessary skills and knowledge to be a math education leader in her region. She hopes to move from the classroom to an administrative position in a school or district, leading math teacher development, curriculum development or some other improvement effort. She would also like to go back to pre-service teacher development work in partnership with a school or district, bringing expert teachers and university professors together in an effort to make the lives and learning of teachers and students as powerful as possible.

ACCLAIM DOCTORAL STUDENT CASE (SECOND COHORT)

Sherry Jones

BACKGROUND

Sherry Jones was born, raised, and lives to this day in Gilmer County, West Virginia. Gilmer County is rural – only one stoplight in the entire county. Sherry graduated from Glenville State College, where she currently teaches, with a degree that prepared her to teach mathematics, business, and language arts.

Her first teaching job was, as she termed it, "a nightmare." She took over teaching 5th, 6th and 7th grade language arts and science for a teacher who left mid-year. The class was unruly, and it seemed like she would not get the chance to actually teach anything because of the serious discipline problems. But, she was ultimately able to deal with the challenges enough to teach, and continued on with her career. After having her children, she taught part-time both at a high school and at Glenville State College. Eventually, in 1981 she went full time at the high school and taught mathematics for the next seven years. Then, in 1988, she was invited to apply for a teaching position again at Glenville State College, where she has been teaching ever since.

Glenville State College, a four year institution, currently enrolls approximately 1,200 students. Many students at the College are first-generation students[3], and many are recruited from high school to play college sports. Many of the students come from the central areas of the state. Sherry teaches the math-oriented business courses in the business department of the college.

COMING TO ACCLAIM

Sherry first heard of ACCLAIM from a West Virginia Council of Teachers of Mathematics newsletter. For a long time she had thought of earning her doctoral degree, but health issues, family responsibilities, and distance to a doctoral-granting institution made the option to return to school hardly viable. At the same time, she grew increasingly frustrated with helping her struggling students understand math. So, she decided to look into ACCLAIM, as she described,

> *I had reached the place where I was getting frustrated with trying to help students understand math. A lot of our business students really struggled with the math-oriented classes. We had some who just breezed through, but there are others who it just seemed*

[3] This refers to students who are the first in their family to attend college.

> *like their background in math is not what you would expect a college student's background to be. It seemed like I was struggling more and more with trying to reach those students, and figure out a way to help them get turned on to math, basically. I was searching for something new that would help me be a better teacher. It seems like if you really try to do a good job at teaching, you are always struggling to grow and to learn new things and to be better at what you do. I don't think you ever give up on that. I was at that place when I saw that little blurb [about ACCLAIM] and I said, this sounds like something I might be able to do, given my health circumstances, given what I am looking for. It sounds like it is something I should look into*[4].

She knew of other people who had pursued doctoral studies in administration or leadership, and knew that didn't interest her. Since ACCLAIM was focused on mathematics – her first love in teaching – she believed that this might be her best opportunity. She contacted Dr. Bob Mayes at WVU, only to discover that the cohort was full. A few months later, Dr. Mayes contacted her and told her that a few students had dropped out, and would she still be interested in the program? After a conversation with him in which she explained her family and health circumstances, she decided to join Cohort Two in the summer of 2004.

SHERRY'S ACCLAIM EXPERIENCE

Sherry has written eloquently about the ways ACCLAIM has influenced her (see http://www.acclaim-math.org/docs/html_rme/rme12/04.26feature_jones.html for the full text of her essay). Among the benefits, she writes about how the unique nature of the five-university cooperative program means that the students are exposed to the best there is in the fields of mathematics, rural education, and teacher education. Furthermore, the fact that students in the cohort hail from different states, teaching contexts, and backgrounds adds an important diversity to the already rich opportunity that is ACCLAIM.

Sherry describes the courses in ACCLAIM as extremely valuable. Prior to ACCLAIM she had not been much exposed to formal learning regarding rural education issues, or rural educational philosophy, and these courses opened up her thinking in ways she did not expect. The mathematics courses helped her "broaden her math background" in ways that helped her apply new ideas immediately in her teaching.

In particular, the first summer in Athens, OH included a course in educational research and epistemology taught by the husband and wife team of Craig and Aimee Howley. This course explored educational research perspectives, with examples from the rural context. While much of the content of this course was new for Sherry, it was an

[4] Quotes are taken from interview transcripts and lightly edited for clarity.

extremely powerful experience for her in that, she reported, it validated what she had observed in the rural schools for some time. She explains:

> *Something happened that first summer that helped me and sort of scared me. The Howleys had us start reading some of the things [in advance of] the summer term, like Peshkin, and some of the other stories about research that has been conducted in rural areas, and in particular some of the political things that go on. Even though I have taught for over 20 years and have seen lots of things, and know that these undercurrents are out there in the school system and you hear people comment about it, to read that in black and white and to know that a researcher went in and saw these things and documented this, it just kind of took me aback. It was like, What does all of this mean? It is hard to describe the feeling that I had about that. I know I am supposed to be here doing what I am doing, but I am not really sure why. But then somehow that confirmed some things for me and made me look at things and trust my judgment a little bit more in my own observations.*

Sherry found a kind of validation in her coursework that both alarmed her ("These things really are happening!") and also comforted her ("I am here for a reason, to do something about it!") As she put it "[These courses] make me believe in myself more." This sentiment is not unique to Sherry – as evaluators for ACCLAIM, we have heard it numerous times over the years from other ACCLAIM doctoral students. Even though many of these students grew up in rural areas and experienced first hand a rural education, reading and talking about it in an academic context brings a new, analytical lens to their experiences.

In addition to the course content, Sherry has been influenced by the kind of teaching she has experienced as a doctoral student. While some courses were less influential than others, Sherry was struck by the extent to which ACCLAIM professors modeled the kind of teaching they were talking about – they were, as she puts it, "walking the talk." This is, as is commonly known, unusual in a higher education setting.

By the end of the second summer (Fall 2005), Sherry expressed that she did not anticipate changing jobs upon completion of the program, or necessarily pursuing a position in a research-oriented institution. She said that she considered herself "a teacher that is practicing what I am learning from research that has been done."

Winter 2007: Approaching the dissertation

At the time of our second interview, Sherry was nearly done with coursework, and comprehensive exams were just a few months away. Her experiences with online courses, coupled with her rural context, has brought her to consider the impact of distance education for undergraduates or high school students in rural areas as a

dissertation topic. She has had increasing opportunities to express her ideas in writing, and found it a "painful, but rewarding process."

However, the greatest benefit of ACCLAIM, from Sherry's perspective, has been the ways it has strengthened her classroom teaching. She has implemented lessons from assignments that she completed for coursework, and emulated some of the teaching strategies she observed. Sherry still plans on staying at Glenville State, but is open to other opportunities that might come her way.

ABOUT THIS CASE

This case illustrates multiple and profound ways that the ACCLAIM program benefited a rural teacher. It describes how a dedicated but frustrated mathematics teacher gained professional development and grounding in research that inspired her and improved her teaching. This case also illustrates how, through its unique schedule and structures designed to meet the needs of working people, ACCLAIM made doing a doctoral program possible for this working person who, in addition to teaching, juggles challenging health issues and family responsibilities. The nature, diversity, and quality of participants in the program – both students and faculty – and the fact that the ACCLAIM program involves five universities, also gave this doctoral student a wider view of the field and of best practices for her teaching.

ACCLAIM DOCTORAL STUDENT CASE (SECOND COHORT)

Courtenay Mays

BACKGROUND

Courtenay Mays was born and raised in Louisville, Kentucky – one of very few ACCLAIM[5] students who grew up in an urban area. Courtenay was one of nine children in a poor and abusive household. She describes her childhood as "typical" for a poor, African American girl – replete with open discrimination. She recalls her 6th grade year, in an advanced program at a top school in Louisville:

> *In 6th grade I was placed in the advanced program because of good grades in elementary school. But going into the advanced program with mostly white, middle class children, I came home crying every day. I was made fun of, the way I dressed and was discriminated against. In the elementary schools I was raised in, I never did notice any kind of differences, but it might have been because everybody in the elementary school was of the same socioeconomic status. In the advanced program, because of the things that I was experiencing from my peers and also from the teachers, I came home crying every single day. I said Mom, you have got to take me out of this program, you have got to take me out. So at the end of my 6th grade year, she took me out - she couldn't take me coming home crying anymore. I ended up at Western Middle School in Louisville, Kentucky and everybody there is pretty much the same socioeconomic status.*[6]

At her new school, while she may have fit in socially, the academic challenge wasn't really there for her. However, her grades picked back up. And then, in 7th grade, she once again experienced discrimination that is with her to this day. She explains:

> *I started off in Western Middle School a straight "A" student. Then, a social studies teacher, a white male social studies teacher, changed that. I had almost perfect scores on all of my papers, and one report came home with a B. I asked him why he gave me a B, and he said that I had missing assignments. I looked through all of my work, and all of my assignments are there, of course, and so he completely and totally cheated me. …So even early on, I had problems with discrimination. Even though you work hard and fight hard, and you are making perfect grades, you end up with a B on your report card.*

[5] Appalachian Collaborative Center for Learning Assessment and Instruction in Mathematics (ACCLAIM) is an NSF-funded Center for Learning and Teaching.
[6] Quotes are taken from interview transcripts and lightly edited for clarity.

These early experiences had a profound impact on Courtenay's life, and she was determined to find a way out. She applied again to her old school for 9th grade, and was accepted. She worked hard – harder than most, she remembers, just to stay on top. She earned a 4.0 GPA all the way through, and in her senior year, became one of the valedictorians. However, her honor was short-lived, as she describes in yet another story of discrimination:

> *I finally made it to my senior year, and I was tied for third place with a white male - we were the only ones with 4.0's. There was another girl who had a B and she ended up convincing the teacher to change her grade, so she ended up with an A. After that, there were three of us that were valedictorians. Now of course, the valedictorians are supposed to give speeches and so our counselor told the other two that they were to give a speech. The girl, who was my friend, told me that I was going to give a speech, and I didn't know anything about a speech. So I went to the counselor and asked, Am I supposed to be giving a speech? I am one of the valedictorians. She said, you can give the speech if you want to, but you really don't have to. And those words are still in my mind to this day. Of course, just because I knew that she didn't want me to give a speech, I ended up giving a speech, but I didn't say all of the things that I really wanted to say. I was really politically correct. But they plant a seed of bitterness, and you try not to let it set up in you, but it sets up in you anyway.*

Despite this negative environment, and very little encouragement from her teachers or school counselor, Courtenay searched for, applied for, and won numerous college scholarships. She felt compelled to succeed for one clear reason – to "escape the abuse" she lived with all her young life. Schoolwork was an opportunity to, as she described, "block the fear" that she lived with on a daily basis.

Courtenay majored in secondary mathematics and education at the University of Kentucky. Ironically, it was her 8th grade math teacher who spurred her interest in math, simply by encouraging her and telling her that she had a gift. This teacher also spurred her interest in becoming a teacher. This was her mission – to make a difference through teaching. In her words:

> *[My 8th grade math teacher] really, really made that difference, and out of all of the stuff that I have been through, and all of the stuff that I was going through at home, it was one teacher that made the difference, and I knew that I wanted to teach. I wanted to be that one. I was going to save the world. I was going to save every black child from discrimination, I was going to be that person that rescued them, or just speak something positive into their spirit, or just give them a chance, to find a scholarship for them, or just make sure that they take the ACT. So I decided that is what I wanted to do.*

As an undergraduate, Courtenay had a daughter, Sierra. After graduation, she decided to get a masters degree in statistics. After a year, it became too consuming, and she felt

it was taking too much time away from her daughter. She switched to a masters in education program, and also earned her initial teaching certificate in math.
She began her teaching career in 2000, and currently teaches 11th and 12th grade math at Great Oakes Institute of Technology in Ohio, a technical high school that offers students both academic credits as well as certificates in a variety of trades, such as dental assistant and automotive technology. In 2003 Courtenay attended the ACCLAIM Leadership Institute[7], which whetted her appetite for more.

COMING TO AND EXPERIENCING ACCLAIM

During the Leadership Institute in the summer of 2003, doctoral students from the first cohort came to talk with the participants about the program. The Institute participants were an ideal pool from which to identify potential doctoral program candidates. Even though she knew she wanted to earn her PhD some day, she was terrified of the possibility. But something inside her took her to the ACCLAIM website, and she applied for Cohort Two.

While Courtenay did not receive the support she was hoping for from her school principal, she persisted in her studies. Like other ACCLAIM students, Courtenay is impressed with the quality of most of the courses, and being exposed to professors from a range of universities and perspectives. She realizes that some of her professors will be part of her intellectual community for years to come.

However, her experiences with other members of her cohort have not been so positive. In her view, an overly competitive atmosphere has been created which has led to feelings of resentment. Unfortunately, in our second interview a year after the first, these feelings had not changed. At the time of our last interview in early 2007, Courtenay reported that she felt connected to only one other person in the cohort and had been struggling with feelings of alienation. She realized that while this was an unanticipated dimension of her experience, it also has forced her to face her own "demons" that may also, she believes, be negatively influencing her experience. Still, she is grateful for the opportunities ACCLAIM has afforded her and is optimistic about her future plans.

Research

Courtenay differs from many ACCLAIM students in that her research interests lean toward issues plaguing urban areas rather than rural, although one could argue that there are many overlapping issues between the education of urban poor and rural

[7] The ACCLAIM Leadership Institute took place in 2003. This program convened over 30 leading math educators in the Appalachian region for a 3 week summer institute plus follow-up work in the academic year.

communities. Growing up and living in the city, she has come to care deeply about the educational experiences of urban students, particularly African American students. She has spent a good deal of her time tutoring students, and imagines that something related to the learning opportunities for African American students will figure prominently in her future.

One aspect of the program that Courtenay hopes will be different for future ACCLAIM doctoral students is providing them more extensive experiences with research prior to developing their dissertation topics. This is a concern that we heard from other ACCLAIM students. Given that students are on their own for the majority of the program, setting up some kind of mentoring situation or opportunity to follow a research project from question through data collection, analysis and writing or presentation would have been very beneficial to Courtenay.

Courtenay's Future

While Courtenay still holds open the possibility of moving to a research or teaching position in higher education, she remains steadfast in her commitment to urban African American youth. One of her dreams is to open and direct a free tutoring center for inner-city students.

ABOUT THIS CASE

This is a case of an African American woman – who represents a minority not only in mathematics education, but in higher education as well – who since elementary school has faced difficult challenges including academic and social discrimination, but who with persistence, determination and some support and inspiration from influential teachers and programs such as ACCLAIM, finds herself pursuing a PhD. It seems likely that she will utilize her knowledge, skills and leadership to support inner-city youth.

The ACCLAIM Leadership Institute, and subsequently the PhD program, not only whetted her appetite for this line of study, but afforded her the opportunities and support to pursue the higher degree. The intellectually and research-rich milieu that ACCLAIM provides Courtenay will most likely serve her well for years to come.

Further, the ACCLAIM doctoral program, focused on issues of mathematics education mostly in rural areas, has overarching themes and applications for other non-dominant groups such as inner-city youth. Even though there are many differences between the environments of urban and rural youth, perhaps some of the lessons learned from

making mathematics education more pertinent and effective in rural contexts might apply to inner-city urban contexts.

ACCLAIM DOCTORAL STUDENT CASE (SECOND COHORT)

Michael Ratliff

BACKGROUND

Mike Ratliff grew up in southern Arkansas in a town with a population of approximately 1,500 people, where his father worked at a local paper mill and his mother worked in a variety of administrative positions until she attended nursing school. Mike's graduating high school class of 55 students had about 50% go on to college which, Mike understands, was an unusually high percentage for that school. Indeed, Mike is one of three in his extended family (of which there are 79 members, all living in the same community) to attend college.

After graduating from high school, Mike left home and attended the University of Arkansas, located in the northwest part of the state. After two years, his family urged him to live at home and attend a local branch of the state university system. Ultimately, he is glad he did:

> *I was upset about [changing schools] at first, but it turned out to be the best thing that ever happened to me. I got down to the University of Arkansas at Monticello and chose physics as a major. There were six physics majors at that time, and we had five professors who worked with physics majors. … I loved it, and for the first time, as far as the college experience, I really didn't feel like a number in a class. Up at Arkansas, you always felt that way, in the large lecture halls with the smallest class being probably around 40 and the largest being chemistry with 350.*[8]

One of his undergraduate professors encouraged him to pursue a graduate degree in mathematics, and helped him get a teaching assistantship to support his studies. Thinking he would just be grading papers, Mike was stunned to find out that he was expected to teach two classes! After overcoming the initial shock and nerves, Mike discovered he thoroughly enjoyed teaching, and decided to get his secondary teaching credential at the same time as his masters. He completed his degree and certification, and went on to teach high school calculus, physics, and geometry for two and a half years.

His greatest lesson as a high school teacher came when he was assigned a 9th grade consumer mathematics course. Mike explains:

[8] Quotes are taken from interview transcripts and lightly edited for clarity.

> *I thought that I was a pretty good teacher until I was assigned the next year a 9th grade consumer mathematics course and that is when I figured out I wasn't as good as I thought I was. It occurred to me that the real motivated kids, you can throw it on the board and they are going to get it, they will find a way. Those in consumer math, those that are non-college bound, that is where the talent is really needed as far as teachers. I learned a lot that year.*

Then, a friend told him about a job at a college that had recently expanded from two to four years, and were increasing their faculty. He decided to give it a try – that was 1990, and he is there to this day.

FINDING ACCLAIM

Knowing that getting on the tenure track would require a doctorate, he entered a doctoral program at the University of Kentucky in 1995, working with Dr. Bill Bush (ACCLAIM PI). He commuted two hours each way, taking one course per semester until he had accumulated 30 hours after five years. Then, after taking a break for personal reasons, and after Dr. Bush moved to University of Louisville, Mike heard about ACCLAIM through Tom Kline, a long-time friend of his, at Marshall University. He attended a meeting where Dr. Bush convinced him that even though he might lose some of the credits he had accumulated at UK, ACCLAIM would be a good fit for him.

Mike joined Cohort 2 and was re-admitted at the University of Kentucky. However, he has moved to the University of Tennessee to finish the program.

On Being Rural

As mentioned above, Mike grew up in a rural community where at least 79 close relatives also lived. However, Mike admits that being from a rural area was something he had "never really thought about" until he started the program.

> *Before [ACCLAIM], I just kind of thought of people as being people, regardless of where you are from, and so that part of the program has really been rich for me. At the same time, I'm thinking I wasn't rural until [ACCLAIM] told me I was rural.*

Through his coursework and interactions with other ACCLAIM students and professors, Mike came to appreciate the unique characteristics that might accompany this "rural" designation. He recalled an experience in high school when he met a friend from another school who was taking calculus – something that wasn't offered at Mike's school. This caused him to wonder if "city schools" had something that rural schools

did not, and vice versa. He appreciates now that issues related to funding and teacher quality often impact rural schools in different ways.

In terms of whether or not "rural math education" differs in any way as a field from math education, Mike sees the value in highlighting the rural experience in a math class, but the math itself is no different. He explains:

> *I think mathematics is valuable no matter whether rural, urban or suburban. My fear, though, is that you have these students who are in rural schools and they are only seeing these urban applications, and therefore they are not valuing [mathematics]. They think it is only useful if you are in that [urban] context. I think it is necessary [to highlight rural] just for that, if nothing else. At the same time, as we train teachers who often wind up in rural communities, they need to understand the power of place-based education and what it can do for a community. The mathematics classroom is a wonderful place for that to occur. Of course you can say there are social justice issues that can show up in a mathematics classroom, and I am not real comfortable with that, but I think over time I will be more comfortable with that. I think it is certainly necessary [to highlight rural] in a math classroom. I think it is important to demonstrate to a student that you can excel in an area or in a discipline and not move away from home in the end. I don't think students always see that.*

Ultimately, Mike believes that math needs to be taught in a way that engages students to see the value in it, regardless of where they live.

Learning How to Learn

Mike talked extensively about the many ways ACCLAIM has benefited him as both a teacher and a learner. In particular, he spoke often of his propensity, before ACCLAIM (and sometimes during) to work alone. He said that he felt more comfortable working on his own and "internalizing" concepts before coming back to a larger group with his ideas. Through his work in ACCLAIM and experiences with the cohort, he came to understand that perhaps that strategy isn't always the best for him, as he explained:

> *I tend to be kind of an introvert anyway, and in fact the cohort members kind of make fun of me, because they understand that when we have some studying to do, I have to go away and do my own thing and kind of internalize and come back before we sit down as a group. … If you gave me a choice to work with a group or not work with a group, I would probably not work with a group. That was two years ago. I think now if you gave me a choice, I would probably work with a group, provided I could pick my group members. …I think I have become stronger because I think I can do a decent job of things on my own, but I think when I work with other people and I hear and listen to their perspectives about things, it just improves the quality of what we do. That part has really surprised me, especially with us being as spread out as we [the ACCLAIM cohort]are.*

Mike believes that the summers – when the cohort is together face-to-face – are critical to enhancing the quality of his experience. While it was challenging, he appreciated the opportunity to engage for a short period of time in an "intense" way, and then after have some time to reflect on the experience. This, he feels, was a mode of learning that worked well for him.

In addition to the summer courses, Mike felt that the internship was extremely valuable, and that some of the activities coupled with the opportunity to work with others gave him the confidence to do things he wouldn't normally do, such as present at national conferences, or put together a panel of experts for a national conference.

> *Without [ACCLAIM] and understanding how things work at a national level, I don't think I would have had the confidence in myself to have a session lined up against all of these other people that you read about. …Without the ACCLAIM program and [internship experiences], I don't think I would have had the confidence to be involved in such a project.*

He commented that the internship added a great deal of richness to the coursework experiences he and other were having in the program, and opened up the field for him in ways that he will continue to utilize in the future.

Finally, Mike has come to realize that even if he does not finish his degree (which he adamantly insisted he would), he has learned more than he anticipated he would about mathematics education and how to be a better mathematics teacher. He reflected,

> *I think I am better at what I do now than I was three years ago. I try not to look at [the program so far] as just course work. I try to look at it as improving. I am a lot more comfortable with mathematics education and I have a much, much better understanding of the field.*

And on the ways in which ACCLAIM has made him a better teacher, he commented,

> *I was in a class where I would say 90% of the geometry content I already knew. The benefit for me was approaching it in a different way, seeing good teaching being modeled. It was great to listen to [Dr. Lee] relate it back to middle and high school classrooms. What if a student responds this way? This didn't happen everyday, it was just very subtly inserted in the instruction. You knew the content, but now you are getting to know it better. Just seeing those teaching styles modeled was wonderful.*

Dissertation Research

Mike's "bottom line" in terms of his dissertation research is focusing on improving teaching and learning for students and teachers. In particular, at the time of our final interview in spring of 2007, Mike had an experience in his own teaching that prompted him to want to examine pre-service teachers' notions of "proof" in geometry. He is not planning to specifically address rural issues in his study, but his experiences in lesson study have made a strong impression on him and he plans to pursue something related to lesson study in rural areas in the future.

AFTER ACCLAIM

Mike has said in the past that he enjoys his current position and feels that he could stay where he is and be quite content professionally. However, over time, he has increasingly wondered if perhaps he would be happier in an environment and among colleagues who were more interested in changing their practice and exploring innovative approaches to teaching. In our spring 2007 interview, Mike stated:

> *I am now wanting a more professional environment, and I couldn't see that two years ago, or even a year and a half ago, but I am certainly seeing it now. Now when I finish, I will probably stay here for one or two years, but I think I would enjoy working at more of a regional university, an Eastern Kentucky University, a Morehead State, Tennessee Martin or something of that nature. I just think I would be more comfortable there. I think I would prefer to be at a place where the emphasis is still on teaching, but at the same time, I do have colleagues there who share common interests and there is opportunity for research. There is not really an opportunity for research where I am now, and if that opportunity did exist, it would be individual. It wouldn't be with someone else, and I think I would prefer to be in a setting where I worked on a research team of two or three or four.*

Mike also mentioned an interest in leadership positions in regional mathematics education organizations, such as AMTE. All of this adds further evidence to ACCLAIM's role in Mike's gradual shift toward becoming more of a collaborative worker and learner. He freely admits that this was not his propensity when he entered the program – in fact, he resisted attempts of professors to force him to work in a group. About his future, he went on to say:

> I really and truly don't want to leave [Lindsey Wilson College] but now my eyes are opening up to other opportunities that might be out there, and the only reason I would want to make a move is so that I wouldn't be alone in my department. I also think that I could have a greater impact, if that makes sense.

> If I am teaching a class of 15 students, instead of a class of five students, I think there is a chance for me having a better impact in the region.

WHAT IS THIS A CASE OF?

This case illustrates how significant an impact ACCLAIM has had on doctoral students' perspectives, learning styles, and career ambitions. Not only did this rural Arkansas native come to appreciate the unique attributes and opportunities of rural education, but through the highly social and collaborative nature of the ACCLAIM doctoral program he learned to challenge his own learning style. He came to value and became more comfortable with a collaborative mode of learning and professional interaction. His new-found confidence and leadership skills have opened up his thinking to new ways he might help improve the region's mathematics education and maximize his impact.

ACCLAIM DOCTORAL STUDENT CASE (SECOND COHORT)

Debbie Waggoner

BACKGROUND

Debbie attended elementary school in a rural area near Lexington, Kentucky, and junior high and high school in Lexington, which she describes as urban. After high school, she went on to the University of Kentucky and majored in middle grades mathematics.

Her first teaching job was in Boyd County, Kentucky, in the eastern part of the state. She moved to that region after she married her husband, who had a family business there. Debbie describes the area as having a "very low socioeconomic status, with virtually no minorities." After four years teaching in the county, and earning her masters degree and Rank One teaching credential at Morehead State, she missed the city enough to move back to Lexington.

Coming from a more urban setting, Debbie found some of the attitudes she encountered in the rural areas unsettling. She explains:

> *The only time I ever lived in a rural place was not an easy time for me. I found that many of my students were very prejudiced, and that was very difficult for me. I know that doesn't mean that every rural place is like that, it just happened to be the community that I was in. There were not any minorities, and I remember when I first came, I put a poster up of Martin Luther King, Jr. on my wall and [somebody] wrote "KKK" on his forehead. That is when I told my husband I needed to move back to the city.*[9]

During her last couple of years in Boyd County, Debbie joined the Kentucky Middle Grades Math Teacher Network, an NSF-funded project led by Dr. Bill Bush. Debbie was one of approximately 30 teacher coaches from across the state who designed professional development seminars among other activities that helped her create lasting connections with math educators around the state. After teaching for two years in Lexington, Debbie worked as a math consultant for the Kentucky State Department, helping to design, test, and refine the state math assessment system. From there, she worked for the Fayette County Public School district as an assessment resource specialist. After another stint with middle school math teaching, she took a position at Eastern Kentucky University (EKU) as an elementary and middle grades math methods instructor. She is now an instructional coach for a large middle school, marking her 17th year in education.

[9] Quotes are taken from interview transcripts and lightly edited for clarity.

Finding ACCLAIM

Debbie heard about the ACCLAIM program in the first year, but was unable to apply due to work and family circumstances. Then, when the opportunity came along for Cohort Two, she applied. When she started at EKU, she knew she would need a PhD if she wanted to get onto the tenure track. Having stayed in touch with Dr. Bush over the years, and, in fact, working with him on other NSF-funded projects (including the ACCLAIM Leadership Institute), she was very knowledgeable about the ACCLAIM PhD program and it seemed like the right fit.

DEBBIE'S EXPERIENCES IN ACCLAIM

After the first year, Debbie was generally satisfied with her courses, except that she had thought there should be a greater emphasis on K-8 mathematics than there was. However, she understands that she is the only middle level math teacher in her cohort.

Debbie came into the program with a great deal of practical experience and knowledge from her years as a teacher, professional developer, and college instructor. Nonetheless, she credits ACCLAIM with providing her learning opportunities in research and mathematics that have been very helpful to her. She had, as a teacher, been very "skeptical" of the value of research. ACCLAIM has begun to change that, as she explains:

> *I am trying not to be as skeptical of research as I used to be, and that is a big step for me. I have always been very much a practitioner and thought about things on that level. I knew that you learn from your students, and you learn how to teach better from teaching. I always felt that it was a very personal thing for me, and trying to see research that other people have done, how to apply it in my situation, is sometimes hard to take. Their circumstances are different and their situations are different. Most of them, whenever you talk to teachers, they will say, well, they didn't have our students, or this is not the same as where they did that research. That is something that I have tried to get a grasp on.*

Like a few others in Cohort Two, Debbie felt that there was not the level of "togetherness" that she had hoped for or knew that existed in cohort One. She became close with a few of the cohort members, but for the most part, she feels Cohort Two has some strong differences that have created some rifts in the group. Overall, though, she feels that she could not have done as well as she has without the support of the cohort.

At the time of our last interview, Debbie was concerned that she did not yet have a topic identified for her dissertation research. She speculated that her challenges were

partly due to the structure of ACCLAIM in that students in a more traditional PhD program, housed at a single university, might have more opportunities to work along side professors conducting research, which could help with formulating a research question.

She does know, however, that she is interested in qualitative research, and would like to explore issues in professional development that helps teachers improve their teaching math for conceptual understanding. She all along has not felt connected to the rural issues the program has been exploring, however she does see the value in studying rural sociology.

In all, ACCLAIM has "opened doors" to opportunities that Debbie does not feel she would have encountered otherwise. She participated in AAMTE[10] meetings, the ACCLAIM Research Symposium, and other events that have strongly influenced her thinking about her career. Midway through the coursework part of the program, Debbie's district, from which she was "on loan" to EKU, required that she return to instructional coaching position at a middle school (for all subject areas – not only mathematics). Originally her impetus to earn her doctoral degree came from her desire to stay at EKU and get on the tenure track. Even though she is no longer in her position at the university, she remains committed to pursuing a career either in higher education or in a district-level math leadership position. She feels that so far, her ACCLAIM experiences have prepared her well for either of these possibilities.

ABOUT THIS CASE

This case is about a strong practitioner – someone with middle-school and university teaching, teacher professional development and assessment specialist experience – who came upon ACCLAIM through a professional network, and first applied to the PhD program for mostly pragmatic reasons. Through the program she has learned to value research more, has learned aspects about mathematics that has helped her, and has gained knowledge and skills that put her in a good position to contribute at many levels – school, district and university.

This case highlights how ACCLAIM can afford a seasoned practitioner – even one not particularly connected to rural issues – a grounding in research, specific skills in mathematics, and the particular perspective of rural contexts, and how all that can be applied to a variety of career choices. The professional connections made through the program are also important and can benefit the practitioner in whatever position they decide to take up in the future.

[10] The AAMTE (Appalachian Association of Mathematics Teacher Educators) is an ACCLAIM-sponsored arm of the national Association of Mathematics Teacher Educators.

This case also points out how the ACCLAIM PhD program perhaps could improve the structure and support they provide students in doing research, especially in finding and refining their dissertation research questions.

APPENDIX B: FACULTY INTERVIEWS

GENERAL PERSPECTIVES ON ACCLAIM

Roles

All of the faculty we spoke with had a clear understanding of his or her role as well as his or her university or department's role in the Center. For those we interviewed who are also on the Management Team, the roles they played on particular initiatives (e.g., the Research Initiative or the Capacity Building Initiative) largely defined and bounded their involvement in the Center. All felt comfortable with their roles, and felt that the Center was taking adequate advantage of what they had to offer.

Those who are what may be termed "loosely" associated with ACCLAIM (e.g., those who taught one course either in the summer or online, and who don't expect to teach again) did not have a clear sense of what potential role they could play in ACCLAIM in the future. Those relatively new to the Center learned about opportunities to participate through attending a meeting on their campus, or through direct invitation by the Center.

Sample comments from professors about their roles in the Center include the following:

> *I feel like my role is sort of as a cheerleader. I hold more commitments in a more specific sense to rural education than to mathematics education, but I have strong beliefs in the value of liberal education for kids. Seeing mathematics as part of [a liberal education] has always been my way of viewing the legacies available to kids that might properly be communicated to them, given to them, shared with them in an educative process. It is not remote to see mathematics as connected to rural, and it just isn't something I would have gone out to think about on my own.*

> *I am finding it to be a bit of a challenge because I am trying to determine what I am expecting myself to be able to do. Should I be expecting myself to engage more in math ed research and publication in that area, or am I regarding myself more of a service to the project and building the initiative? At this point I have not been involved in any formal research with ACCLAIM, and I guess at a certain point soon I should be deciding what I see my research profile doing.*

In addition to their "formal" roles, most faculty we spoke with envision that they will be involved in other aspects of ACCLAIM. For example, a few faculty who taught a course hope to be involved in the future, either by teaching another or the same course, advising students, or attending a conference.

Incentives to participate in ACCLAIM

Faculty participate in ACCLAIM for a variety of reasons, not least being their general commitment to the improvement of mathematics teaching and their more specific interest in contributing to learning in rural areas. They also reported that a major draw for them is the high caliber people involved in the Center: the management team, the graduate students, and the advisors. Several faculty mentioned the opportunity to work with this group of people as a privilege. And, they all mentioned that their university administrations were either explicitly supportive of their involvement, or at least did not get in their way.

Sample comments about incentives to participate:

> *I am a tenured, full professor, and I have a pretty good sense of what opportunities I have to have for my life to make a difference. I make decisions based on that.*
>
> *[A project I direct at my institution] had several missions, but two of the primary ones were reform or restructuring, if you will, of beginning undergraduate courses, to try to improve student success, and influencing the teaching and learning of mathematics in the state and region at least, if not nationally. Now, that goal of influencing teaching and learning outside of the university means that you need to do outreach. ACCLAIM is the cornerstone of the outreach that we do. I think the university has been very supportive of that.*
>
> *[I participate in ACCLAIM for] fellowship. I am not joking. I think it is a decent crew, and I enjoy watching how the management issues of running the Center play out. It seems to me that there is a high level of commitment to the work in the management team and the various folks that we work with. Behind the intellectual stuff there is practical stuff…and I think if we can articulate these things and put them in play, they are going to have an inevitable influence. People will find them, people will read them, and people will start thinking about changing the way they work as a result.*
>
> *The opportunities to travel, to go to the Center for Learning and Teaching joint meeting, and speak with other math education and rural education leaders from around the country, is invaluable. You can't put a dollar sign on that. That professional activity and engagement is very important to me.*

As mentioned, it is significant that all of the professors we interviewed have tenure, which they reported allowed them the freedom to engage in projects like ACCLAIM. Indeed, many reported that of the numerous projects they are involved in, ACCLAIM provides the most professional stimulation and gratification.

General impressions about the ACCLAIM graduate students

Overall, the faculty hold very favorable impressions of the graduate students (both cohorts). As with any doctoral program, they have observed that there is a range of ability and promise within the group, but in general most agreed that the ACCLIAM students are as good as (or better than) graduate students they have advised or taught in the past.

In general, the mathematics professors believe that the students were competent in mathematics, but there were some students who needed extra help or effort in some areas. Mathematics and rural education professors were not overly concerned (although not unconcerned) with the mathematics competency issue. Rather, they emphasized that the students are very open to new ideas, and able to engage well with rural questions and problems related to mathematics.

Several faculty mentioned the power of the cohort model and the supportive dynamics that have evolved, particularly in the first cohort. They noted that there are both pluses and minuses to this dynamic – the pluses being that the close-knit nature of the group enables them to work well together and support one another, the minuses being the "group-think" and "revolt" that can result from a few key agitators.

Faculty believe that nearly all of the students in the two cohorts have the potential to assume leadership positions in the region, and are well positioned to have a positive impact on the improvement of teaching and learning mathematics in Appalachia. A few students who have already been recruited and hired in the region (even prior to advancement to candidacy) were cited as examples of both the quality of the students and the real need for qualified people.

Comments from the faculty about the graduate students include:

> *I think there is some kind of a feeling of bonding that has happened. They were aware that they were inventing things as they went along. I guess the first activities that they had helped them see that they were better off working together. It struck me that there was a little friction occasionally, just because there were different skill levels, but I think it wasn't enough to really hurt anything; it was just something I was aware of.*
>
> *I was really impressed, and you could just tell that these were people coming into their own intellectually. They never had the opportunity to think so broadly and deeply about these kinds of issues, and I think they will be great spokespersons.*
>
> *I honestly think things are going well, but the real proof is going to come probably five years down the line as people in this first cohort finish their degrees and then move into the*

leadership positions that ACCLAIM is grooming them for. What strikes me as potential success is that the people who are in the program are for the most part very region-grounded and they are going to stay put.

[The students] really think they are there to consider the issues. At the same time, I think part of what is an incentive for some of them [is that they] are in positions where a doctorate is almost required, like they are teaching college already. And many of them are improvement-focused people, and they see a doctorate as a way in which they can have more clout as improvers. I think they were intellectually engaged and fairly affable as a cohort… But…these people do not have broad liberal arts understandings, and so they don't come to the table having read in sociology enough to really think about rural issues from an informed vantage, and they don't know the history of philosophy, and so understanding how educational philosophy fits into a larger picture of philosophy is not there for them either. They have obviously sophisticated mathematical knowledge, but in some senses one suspects that at least for some of them they are not flexible with it.

They have matured a lot. You can be really direct with them about what is working and what is not, and really lay it out. One student really needed some of that, and so I sat down with her for some time and talked to her. She was really earnest about it, and was extremely mature about it. We really talked about how to deal with that and how to work through that. I was very impressed.

They vary, of course, in mathematical ability versus education. I would say for the most part, I think they are stronger than previous math education graduates that I have had in the mathematics area. There are a few of them that aren't as strong in that area, but there are probably only a few that I would put in the category of not being extremely strong in mathematics.

My biggest impression of them is they are very dedicated. I think they are very capable and strong mathematically, and some of them who are very strong in mathematics will gain a lot out of this program in the math education aspect, and vice versa. All of them are gaining from the rural aspect that probably none of them have experienced. That is the new lens that is brought to this, even if the other two lenses are just kind of focusing, that lens is brand new. The students bring a level of experience too, and one of the things about having these place-based type programs where people can stay put, is that they have been in a place – maybe for a long time – with this goal, and they have been leaders. They have done a lot of good work in trying to lead education in the area that they are in, but they haven't had a means really of getting this degree [until now].

I would say that I think they are really high in dedication and commitment, and we have almost all of them still around under the grueling demands of the program. I think they reflect some typical cohort behavior, like we think as a group that structures should do this or that or shouldn't do that, so that is a big change from the usual interaction with [other] graduate students.

I see their strength as being their dedication and commitment and their performance. I thought they did well in my course. I thought … they generally met the standards, and in cases where they wouldn't I gave them the benefit of the doubt. And one after another, they have been to Washington for PI meetings, and I think they represent us well. My overall impression is that they are very strong, and any shortcomings would be in admitting people that were mathematically weak. Otherwise, I would consider them to be generally very strong.

One professor raised the dilemma of producing well-prepared, smart students who may need a different level of challenge than the region's IHEs may be able to provide:

There is an issue with this group about the balance between practicality and truly having them reach their potential. Part of the purpose of ACCLAIM is to help them stay in the region, but if they are really talented and you really get them super-prepared, the region can't really challenge them at a level that they are capable of meeting. So, that is a bit of a problem. Then again, a lot of them are going to be perfectly happy doing that, and so you are going to have some really talented people in these areas and so that is good. It is kind of like a double-edged sword, but it is no different than the problems that Appalachia faces in almost every arena. Until we get a lot more talented people in there, who really are super-trained, we've got to keep trying. I think this is the best thing I have seen so far to get people and keep them in those areas.

Another suggested that a transition from student to colleague is beginning to happen in some cases, which is a "normal" part of the evolution of a graduate student and can be complicated.

I see that some of the students are growing professionally and I think the relationship they are having to the faculty is maturing too. I think this is really tricky, because it is the same with all doctoral students in any disciplines, and it is one of the few places where you really move quite distinctively from being a student to being a colleague in a very short period of time. It is an awkward transition sometimes because you come to not refer to faculty by their first names, but by the end, perhaps in some point, you are colleagues… I am sensing some of these shifts.

Some of the faculty compared the ACCLAIM students with other students they have taught:

I could compare them with other teachers that I have worked with, or can compare them with mathematics graduate students. I would say that compared with mathematics graduate students, they probably come in with a little less background and so there is a bit extra work to make them comfortable with the mathematical way of thinking. Compared to teachers, they are the cream of the crop. I think that the recruiting ended up getting students who were very motivated and driven to succeed. I think the summer programs that they had gone

through prior to when I was involved with them, they were very comfortable with what the expectations were and saw the big picture. I was impressed.

I think they are a better caliber than the last bunch of students that I taught. They write better and they seem to be able to suspend disbelief about their own correctness, disbelief about their own certainty. The summer class was probably the high point of my teaching career and I hope I don't have to teach again, because I don't want to lose that feeling.

I am not sure that they are going to have as many research courses or statistical courses as what mine do, although probably as many as most graduates. …I do think they probably have at least as much mathematics, and in some cases, much more mathematics courses, because at NSF, they thought it was a major weakness, the mathematics level. I don't know if I agree with that, but it is just what it is.

General reflections on teaching in ACCLAIM

To a person, faculty reported that teaching in the ACCLAIM doctoral program has been a very rewarding – albeit sometimes grueling – experience. They described spending a great deal of time – over and above what they normally spend – conceptualizing, planning, and teaching their courses. In one case, a professor requested and received additional support for course development. During that time he visited the cohort in the summer prior to his scheduled course to get to know the students as individuals, as well as the expectations of an ACCLAIM summer course experience.

Faculty who have taught using the online system Centra believe it is an adequate system for teaching online, and for those who taught a distance course prior to Centra believe it is a vast improvement over previous systems.

Some faculty described ways that teaching in ACCLAIM has influenced their own or their colleagues' teaching of other courses, either inside or outside of ACCLAIM.

I certainly expect to use some of the insights that I got out of it to make me a better teacher.

It taught me a little bit about how to be more minimalist, to be effective. That would be the main lesson.

I think my first teaching statement when we had to make portfolios at my university was that the first time that a concept was presented I wanted to make sure that I presented it as clearly and as carefully and as illuminatingly as possible. Now, I must admit that I am becoming more and more confused, but not in a negative sense. I know now and I can see the value of conceptual building that can happen in a classroom if the right environment is provided. I have certainly enthusiastically experimented with revising courses, and there is more exploration and building of concepts, but I am never really sure. Now I am trying to

struggle with, what is the best environment on a concept-by-concept basis, or a course-by-course basis? I am readapting, trying to figure out how to cover the same amount of material that would be covered in a straight lecture style. I think with peer presentation and good homework assignments and discussion of the homework, there is a certain amount of understanding that is gained in upper level math classes. I'm trying to really understand what a good balance is, and ultimately what are the benefits several years down the road.

Research

Other than those directly involved in the Research Initiative, the faculty interviewed were not all that familiar with the research agenda of the Center. However, what they do know of it they viewed as an opportunity to learn about new ideas and problems that are relevant to the work they do in and outside of ACCLAIM.

One professor described how ACCLAIM research has begun to illuminate questions he has often wondered about and about which, to some extent, he has maintained a certain degree of skepticism:

My career has certainly not centered around studying sociological-type differences in [math learning]; that certainly has not been my strength. What has been good for me is that I am getting my eyes more opened about those kinds of issues. To put it in a little different perspective, I have always been a little skeptical that in mathematics I needed to teach differently somehow to different ethnicities or to different genders. Instead I thought that if I teach really, really well, that is good enough. The rural issue is much like that too. Is there really something else that I need to be doing, or that I can do to try to improve the opportunities for students in rural areas to learn mathematics? I now think there is a legitimate question there.

Another described the research agenda of the Center as too nascent to comment on, or at least to describe in a coherent way:

There is no research area – it is like a big unfilled drawing; you can put anything in any corner and it adds to what there is. I think new fields do that. I think part of the research agenda is to paint by numbers and to put something over here and something over here and fill gaps, because it is a huge unfilled domain. I have problems with seeing a research agenda. … I see a place for the research initiative as being a kind of seed bed where research ideas ferment and where there is a connection between faculty and students conducting research; where the field is made more attentive to the connections between math ed and rural ed by drawing on researchers in math ed and rural ed….

I think the initiative has been fairly successful in getting the rural ed people to think about math ed, but not so successful in getting the math ed people to think about rural. I think it would be much easier to think about what is useful in mathematics education with rural

people than it is to think about what is rural about mathematics and mathematics education. So I think it is an easier fit to go the direction that people are going, conceptually.

A few commented on the quality of the people heading up the Research Initiative. Specifically, people spoke to the value of the work in this initiative, not only to the larger research community but also to those closely involved with ACCLAIM who did not enter the project with a very strong or deep understanding of rural issues, or potential relationships between rural and mathematics education:

I think at the very beginning, when ACCLAIM was just begun, I had very limited understanding of the scope of math ed research, and it was clear that the two heading up the research initiative were quick off the mark in getting going and beginning to look at ways to collect information that is already available and disseminated. I think that they have done a good job in providing information to people such as me, and the Rural Math Educator and the occasional papers and things like that is a ready place to go to get started on things. I found that useful.

I get the sense that we are really trying to figure out this whole new area of research that really hasn't existed before. There has been this small amount of research done in the rural area and then there has been this huge amount of research done in math education, but even if math education pretended to focus on rural issues, maybe it wasn't doing it very deeply or in a very appropriate way, it was like, well it is rural because they were in small schools. I feel like we have an expert national leader in this area, and their connections with the other 10 top people in the country that are in this area. Going to the research conference a year ago and just hearing them talk about different perspectives of rural education was great. I feel like I needed to be educated in this area and I still probably need to be more educated in the area and it is one of the reasons I am really interested in trying to find the time and the appropriate avenue.

When asked to comment on the extent to which the research to-date addresses important questions, or issues of practice, some faculty had a difficult time answering because for them, the field is still too ill-defined to know what the right questions are, or what it would mean for the research to be applied in a practical setting.

I think it is too early. I think ten years, 20 years is time when you start to say if things are really making sense. There is formative work here and I think it is good formative work, but I watched my colleagues in instructional technology which is a kind of new field and the research initiatives in that area mostly are junk, and that is how it is with new disciplines. You've got to mess around and try stuff out and this is always going to be interdisciplinary, there is no discipline called rural math education; there will never be, but the interdisciplinary synergies that can happen potentially is pretty powerful.

One faculty member believes that ACCLAIM is addressing a very important domain and has the potential to add great value to the knowledge base, primarily because of the numbers of students who attend school in rural areas.

> *Much of this hinges on how you view learning, or what your current learning theory is. For example, if it is a little bit more behavioral, or with stimulus sets of instructions, just trying to elicit the responses that equals learning, then I don't think this is an important domain. However, if [one believes] learning is more complicated, and if new ideas have to be understood in the context of something, then this is a very important domain. Twenty-five percent of all of the students in this country come from rural locales, and I think it represents probably close to 60% of all of the schools – that is a sizeable population. I think the more we understand about the development of understanding, or the more we understand about how kids come to be able to manipulate mathematics and use it and so on, the more context is important. ACCLAIM seems to hit the nail on the head with what they are trying to accomplish.*

Another faculty member suggested that the research base in rural education and its intersection with subject specific research was inadequate as a basis for building a new agenda:

> *If you are saying it is the intersection, then probably the answer is that it builds negatively on me for work in the field. The past work in that intersection just exploits rural places as a convenient place to do research and it has nothing to do with context. That is a good thing to know, but that is where the benchmark is; that is where the baseline is.*

Regarding their impression of the quality of the research the reviews were mixed, which – they reported – is to be expected of a new field. They acknowledged that creating a new research agenda and then actually designing and conducting the research, is not straightforward.

> *I would say that none of it is less than good, and some of it verges on excellence.*

> *I think the work they are doing is good and they are asking good questions for that area. Some of the issues I find are pretty fascinating, like [research that speaks to] not being from there, but being from there at the same time. I understand it because I grew up in a rural area, and it wasn't a whole lot different. There are newcomers and us. The newcomers might have been there for 10 or 15 years. It isn't strangers, it is newcomers. They are doing some nice studies about where it has an impact and how you bridge that.*

> *If you look at it through a pragmatic lens, I would say the quality is good. If you are looking at it through a pure research lens, where somebody would stand up from AERA and say what they thought about it, then I am not sure the quality is as strong. That would be my gut level reaction. I would say some of the papers are more of a rigorous nature and could withstand that kind of scrutiny. I think that we have applied some rigor to the field, but*

there are all different levels of what is considered good research and it depends a little bit on your definition.

The Research Symposium was mentioned by several faculty as an important, and for some, central, component of the research effort of the Center, particularly as a venue for graduate students to learn about and share research. One faculty expressed this idea quite clearly:

I think [the Research Symposium] is the point of juncture between the research initiative and the doctoral mission which is really the largest mission of the Center. In other words, its major work is producing these leaders, these rural math ed leaders and so they form the center pieces of the work of the Center. Therefore, connecting the other parts to the doctoral piece seems important. I think the Center has done better than most others in terms of being able to do that. Connecting the students to the research initiatives through the Research Conference seems like a very logical step.

Value added to the faculty

The majority of those interviewed stated that their involvement in ACCLAIM has added tremendous value to their professional lives. The comments provided below capture the range of ways this is happening among the faculty.

I get to shape a research agenda and I get to talk to people who are interested in doing that, and we are not overly concerned about offending anybody. …I am tickled pink to be playing with mathematicians and math educators. I am a person who likes math. I don't know a lot of math; I know as much math as many graduate students do when they enter the program… In a sense it is intellectually, professionally and emotionally satisfying.

I think it is really getting to work alongside some of my students doing projects that are supported. That seems like it is not a lot, but actually, it is pretty important.

Well, you've got to go back to the rural perspective. One thing that caused me to go back to some of my rural roots was in my course, the doctoral students and I were sharing about where we came from, and I shared some of [my rural background] and they were pretty stunned. A lot of them came back to me later and told me they had no idea about my background, and that helped them understand me a little bit better, but it also helped me understand me a little bit better. Working in a rural setting is something that goes pretty deep with me. It helps me to understand that better, but it also helps me be more sensitive to some urban issues as well. And finding ways to connect that is what is a potential here. It hasn't happened yet, but it awakened in me that potential I had before.

I think ACCLAIM has provided an environment in which I can begin to conceive of the idea that an individual can participate within a larger community to build regional capacity,

which initially I did not have a clear conception of at all, what role I could play. I attribute that to the fact that ACCLAIM is a large project and some of the people there have more experience already in working in regional arenas. I have always been concerned about the training of teachers and what goes on in school districts, but I have not been directly involved in those activities apart from some short-term projects or classroom visits at invitations of teachers. I enjoy those immensely, so providing a structure or a framework for participation and constructive participation, I regard that as very significant, both personally and professionally.

The opportunity to work with a group of educators from my region in areas as diverse as math and rural education and rural sociology and math education has been extremely valuable. ACCLAIM has provided me the opportunity to actually set up on a regional – and I think with that last meeting we are becoming a national – stage. I was sitting in a room with 20 other people leading a discussion about distance education in mathematics and that was an opportunity that was directly due to ACCLAIM. I tell Bill and Vena at almost every meeting how much I appreciate the professional activity that ACCLAIM provides, and the opportunity to travel and to go to the special conferences that we put together with national leaders, and work with what I think is a very innovative Ph.D. program.

I am just so much more fulfilled and happier because of ACCLAIM than I would be otherwise, and I am unequivocal about that. But also, and there are other things, too, like the PI meetings. I have built ties with Deborah Ball; I have reinforced ties with Jeremy Kilpatrick; these are the top people in the field. ACCLAIM has had that added value for me… We have just interacted with a host of marvelous people. So my professional experience has been so much richer. I am just pleased to know all of the cohort people and I am impressed with them. …That has been a joy and so it has been very fulfilling and a greatly widening experience for me. That is very genuine.

Faculty contributions

Faculty also discussed ways they feel they have contributed to the Center. In addition to the teaching they have done, or contributions they have made as a management team member, the faculty feel they have made important individual contributions to help move the Center forward.

I have been able to get the researchers in math ed to come here and do things, partly because we have resources and we pay them but that doesn't necessarily mean they would come! I feel like I have brought people into the ACCLAIM effort. I think that my position in the field, lots of experience being at the end, not being driven by how much grant money I get or anything, is a contribution. I also feel like I have been able to look at the biggest possible picture and fight in ways for what is best for the people.

I think my involvement as a mathematician is a healthy thing for people whose goal it is to be math educators. I have some models for what a friendly mathematician looks like and I am

motivated by questions of mathematical duty, and mathematical truth. But I think that I am able to get across that I can still be that way and care about where they are coming from, and how they are going to take their background and use that to make sense of it all.

I think I offer a conception of the connection between mathematics and rural education and I hope to lead that forward or push the envelope there. …So the construction of what research is or how we might position ourselves with respect to the project of research is something that I can speak to. There are also all of the buddies that I have in rural education who are willing to play with the Center. I think it is because they trust my assessment of what is going on here.

I don't know… my contribution is sort of as a little engine. Right now, I get my students to think about whether they want to participate, and the Center is producing the work that engages students in research efforts. …I think that kind of stuff helps the students see the connection between the doctoral study and larger research issues.

The doctoral program is probably the area I worked in the most. …I put together the infrastructure that allowed us to grow the math ed program here to provide advisors for a good number of doctoral students.

I have a broader sense of mathematical ideas than I would say most teachers have, and I am not trying to say this in a negative way. As someone who has a Ph.D. in math, I probably understand some aspects of mathematics directly and more deeply than some of my colleagues in other projects, but then they understand math education more deeply than I understand mathematics. But I think knowing what working mathematics can be in certain contexts and knowing the concepts of mathematics, I think there is a large role for mathematicians to play and I hope I have contributed to that.

I would like to say something about how unique and how valuable this program is. Certainly my institution recognizes its value, and the extent to which it allowed us to think about our whole university mission a little differently. I think that is significant. I think that we value having that connection with the other institutions. We have a research mission and it really is growing and just fits in with where we want to go.

Another real neat plus here is that [ACCLAIM is] breaking down some walls that have been historically pretty high – between mathematics educators and mathematicians out of the mathematics departments. In the meetings that I have attended, I see a lot less of a disconnect there, and I think that is attributable to leadership skills. We are all on the same time here, and we are trying to get something accomplished on behalf of kids in rural areas. I think when it is framed that way by capable people, some of this old stereotypical kinds of antipathies just have to go away. I think that has been a real plus, and that demonstrates some real leadership in the part of the people involved in the project.

Advice to the MT/Concerns

A few faculty raised some concerns about the Center. Some of their concerns were mentioned as problems that are inevitable in creating a new field, or starting a new doctoral program. Others related to programmatic aspects of the Center, such as the PDTs and the relationship of the TDI to the mission of ACCLAIM. While it is important that these concerns are shared, it should be emphasized that the faculty stressed that these issues are minor compared to the strong positive impressions and feelings they have about the work of ACCLAIM.

Some sample comments:

> *I am really concerned about how we staff committees with these students with respect to the rural question, a discussion that we have had with the management team a couple of times. We will see how it works out. I am concerned to identify and cultivate students who might have an interest in doing a quantitative study and there are a couple of candidates among the doctoral cohorts.*
>
> *With ACCLAIM, they have a set of rural classes, the research classes, the math classes and the math ed classes and how those things fit together in their minds is not clear to me. Who is weaving it together? A story can certainly be woven of how those things fit together, but who is doing that? I don't know.*
>
> *I think I am not sure that the partnership between the institutions is where it needs to be yet. I think it was pretty monumental what they have been able to do, and I would like to take it to the next level without being competitive, and that is really hard. That is an issue that is still open and I don't want to open up any wounds. …I thought it was a real strength bringing on West Virginia, that was good. I am pretty hopeful about that.*