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ABSTRACT

This paper outlines how shared decision making among teacher education faculty, PK-12 educators, and mathematics and science faculty lead to the preparation of quality educators within Wright State University's (WSU) "Partners Transforming Education: School-University-Community" program. This program was designed to simultaneously renew preservice and PK-12 education. It involves a newly designed teacher education curriculum, a conceptualized postbaccalaureate professional school model for middle and high school teachers, and four partnership PK-12 school sites. College faculty, school teachers, and community members collaborate in the renewal process. An important part of the University's efforts to build bridges within the institution and more effectively integrate the separate pieces of teacher education, is the interaction between the College of Science and Mathematics and the College of Education and Human Services. This effort works to ameliorate institutional barriers which have traditionally impeded intercollegiate collaboration toward improved preservice and inservice professional development and pedagogical practice. This paper describes WSU's integration of science and mathematics using the Praxis III model; presents a historical perspective on the process of developing collaborative teaching programs at WSU; and reflects on tenure and promotions within this collaborative model. (Contains 19 references.) (SM)

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Wright State University

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Developing, Sustaining and Assessing Collaborative Structures with Education, Science, Mathematics and English

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Developing, Sustaining and Assessing Collaborative Structures With Education and the Arts & Sciences

Section A: Dr. Donna Cole, Professor and Director Office of Professional Field Experiences

Introduction

Traditionally the College of Education & the Arts and Sciences have failed to interact supportively in the preparation of teachers. In this paper a process for involvement of diverse partners will be discussed.

A medium size state university, in the mid-west where the environment for this systemic change is occurring. The College of Education & Human Services (CEHS) and the College of Mathematics & Science (COSM)have worked simultaneously to revise content coursework in COSM as well as pedagogical classes in CEHS for alignment with learned society standards.

This paper outlines how shared decision-making among teacher education faculty, PK-12 educators and the Mathematics & Science faculty successfully lead to the preparation of quality educators. Wright State University (WSU) a metropolitan community-focused university, part of the National Network for Educational Renewal (NNER), was selected in 1994 as one of 18 institutions whose the process of teacher education reform made extensive use of PK-12 sector involvement. This university successfully passed NCATE review in the fall of 1996 and developed several joint appointments between CEHS and COSM. This pivotal factor has made it possible to insure that learned society guidelines are infused into content courses of both elementary and secondary pre-service students. The following serves as an overview of our discussion.

Historical Overview of Wright State Redesign Efforts

Partners Transforming Education: School•University•Community was a process model to plan and articulate the simultaneous renewal of the education of educators and the PreK-12

sector. The College of Education and Human Services, Wright State University, has been formally involved in this ongoing process to bring about systemic change to PreK-higher education since January, 1992. *Partners Transforming Education* has involved over 430 people, representatives of the PreK-12 sector, business, human service agencies, the University, the military, and others, to give input on the changes needed to create a new culture of collaborative educators responsive to society's needs.

Individuals from the PreK-12 sector, working with this initiative, are classroom teachers and administrators representative of a number of school systems within the Dayton metropolitan region that Wright State University serves. With the amount of criticism aimed at the public schools and the growing concern about teacher education programs, educators can no longer work in isolation. The College has faced this challenge and invited not only the PreK-12 sector to join hands in problem solving, but has turned to the University at large, as well as to the Community to work collaboratively in building a program that will prepare more qualified pre-service teachers and renew PreK-12 and higher education faculties and administrators.

The concept of "simultaneous renewal" of both PreK-12 and Teacher Education surfaced as an essential component of our advancement efforts. No partnership can exist where only one partner grows and benefits. As Goodlad establishes in *Educational Renewal: Better Teachers, Better Schools* (1994), working together must be mutually advantageous.

Partners Transforming Education is moving forward our newly designed teacher education curricula, a conceptualized post baccalaureate professional school model for middle school and high school educators. Also, WSU has formally established four partnership school sites within local PreK-12 schools. Classroom teachers, school administrators, arts and sciences faculty, education and human services faculty, and community representatives will continue

serving as integral collaborators in the ongoing process for renewal. All partners are actively involved in professional development activities and an advisory structure. The CHES agenda focuses our energy and resources in alignment with the College's conceptual framework: *"To foster the art and sciences of teaching."* Partner schools and districts also have an identified agenda of specific goals and improvements. Partnershipping goals focus on moving the agenda of both parties forward.

Wright State University has made extensive efforts to build bridges within our institution to more effectively integrate the commonly separate pieces of the teacher education enterprise. Nowhere is this initiative more visible than in interactions between the College of Science and Mathematics (COSM) and the College of Education and Human Services (CEHS). Over the last seven years, WSU has appointed six joint appointment faculty to the Department of Teacher Education and various respective departments in the COSM. These individuals, as well as several regular COSM faculty, and in-service teachers have formed the nucleus of a science education team. This core-teaching nucleus has been charged with the responsibility to ameliorate various institutional barriers, which have traditionally represented impediments to intercollegial collaboration towards improved pre-service and in-service professional development and pedagogical practice.

Wright State University is immersed in change. Change in our teacher preparation program as the state of Ohio moves from teacher certification to licensure. Change in our courses as we continue to strive to develop science content courses that incorporate "best practices" and effective science teaching pedagogy. Change also in our roles as college faculty as we move from beginning assistant professors to more seasoned, more "connected"

knowledgeable facilitators of the simultaneous renewal and partnershipping efforts within the professional development schools in which we work.

Section B: Dr. James Tomlin, Associate Professor of Education and Biology

Integrating Science with PRAXIS III Model

At WSU we believe that the PRAXIS III criteria, designed to be generic to all disciplines, can be enhanced by content mandates from the various learned societies. Science was the first content area where alignments with the Praxis III 4 Domains were attempted. Attention was given to the NSF report (1996) entitled, "Shaping the Future: New Expectations for all Understanding Education in Science, Mathematics, Engineering and Technology". The following are several key summations of this report:

- College science and math programs should be refocused in order to better educate the 80 percent of the students who do not major in the science discipline.
- All students should learn these subjects by direct experience with the method and processes of inquiry.
- Any sustained national effort to improve science and math achievement eventually must address the quality of teacher education at the undergraduate level.
- Few teachers, particularly those at the elementary level, experience any teaching that stresses the skills of inquiry and investigation, they simply never experience those methods in their teaching.
- Faculty must actively engage their students preparing to be K-12 teachers (as well as others) by assisting them to learn not only science facts, but also the methods and processes of research, what scientists and engineers do, how to make informed judgements about technical matters, and how to communicate and work in teams to solve complex problems.
- While some institutions already are making the changes needed to help them meet that goal, most are not.

Traditionally at most universities two entities, the Arts & Science colleges and the College of Education & Human Services (CEHS) failed to interface as seamlessly as possible. At

WSU we are appreciative of our inter-collegial partnerships. Over the last 8 years several noteworthy collaborations have resulted. Of particular interest to the issue of best practice content discipline are:

A. joint faculty appointments, which resulted in, improved science and math content courses for pre-service teachers as well as pedagogical framework within these courses.

B. infusion of learned society standards into the PRAXIS Domains.

Six joint appointments exist currently at WSU. Two of the six exist between the Mathematics Department and Teacher Education (TED). Moreover, three tenure lines are secured for mathematics educators rather than mathematicians. One mathematics educator line rests solely in the Mathematics Department. The other two math lines are split between the two colleges. The first split position has the majority of responsibility to the Education Department, while the second position responsibility lies within the Mathematics Department. The remaining joint positions are housed between the sciences and teacher education. Two of the science lines reside in Biology. Our lines were mirror opposites (i.e., 1 2/3 COSM + 1/3 CEHS + 1 2/3 CEHS + 1/3 COSM).

This cadre of science and mathematics educators are helping to produce a core of "best practice" public school teachers who are taking standards-based graduate and undergraduate courses and in-service workshops. To account for "best practice" the learned society standards have been infused into the PRAXIS III Domains and criteria documentation in certified teachers' portfolios.

To assist teachers in developing pedagogical skills, curriculum knowledge and attitudes and dispositions necessary to educate <u>all</u> students, university and/or site based courses and partner school learning activities are constructed to exemplify good science and mathematics

teaching. These courses demonstrate the content and pedagogy of exemplary teaching that recent science education standards state are necessary. Within these classes valuable and practical learning episodes occur to support excellence and equity for pre-college students. Accordingly, we now have early and middle childhood science programs which not only strive to achieve science content understandings congruent with the *Ohio State Science Model*, the National Research Council's *National Science Education Standards* and AAAS *Benchmarks for Science Literacy*, but also seek to impart pedagogical content knowledge specific to individual science disciplines. Moreover, student understandings are acquired within an active and constructivist inquiry-based framework designed to enable students to witness science and science education faculty "walking the walk and not just talking the talk."

Working with both pre-service and now in-service teachers in our science courses creates greater potential for blending science education theory with best teaching practices in the partnership classroom as thus benefiting students and teachers alike. Presently, CEHS is exploring ways to match pre-service teachers' experiences from the initial early observational phase to internships, and student teaching with in-service teachers who are immersed in our expanded science course offerings. This process requires finding ways to overcome many of the traditional ways in which school districts place pre-service teachers in classrooms. This is proving to be another challenge for change--change within the traditional culture of the school districts and the university system. CEHS's feeling at this point reflects Michael Fullan's "Ready, Fire, Aim" approach, we keep moving forward even when the path is not clearly visible in front of us (Fullan, 1998). Some of that "surefootedness" comes from the college's years of learning to deal successfully with the constancy of ambiguity and change while proceeding

forward. However, CEHS is confident because the strategy has proven successful for implementing and institutionalizing our ever-changing science education program.

Two example courses include a content biology course developed and taught by science educators with strong content preparation and a content specific science "methods course" developed and taught in collaboration with scientists and science educators with extensive pre-college science teaching experience. Assessment issues related to classroom performance are evaluated within a context that is reflective, authentic and congruent with performance-based state licensure requirements, as well as learned society content standards for NCATE accreditation.

Joint faculty in science education has developed a conceptual framework for undergraduate elementary pre-service students at WSU. The framework contains six levels. The first level consists of a foundational course aimed at developing initial science literacy and problem solving. The second level involves four conceptual units in physics, chemistry, geology and biology. The third level builds on level two advancing knowledge and skills in the four science disciplines (physics, chemistry, geology and biology). The fourth level requires students to complete projects in science. The final two levels involve post baccalaureate science teaching application. Level five integrates math and science methods, while a capstone level includes supervised field and intern placements (see Figure 1). Being a faculty member in two colleges is perhaps the best training for us to learn to cope with the ebb and flow of ambiguity and the tension of serving two masters in our efforts to work in the A&S, CEHS and in PDS sites.

This flexibility and openness to ever changing ideas and methodologies has permitted us to effectively develop a science program based on the State and National Science Standards and to be responsive to the science technology needs of in-service teachers. CEHS has now moved

on in our program changes and developments modifying our science courses to allow classroom teachers opportunities to learn content while updating their understanding of science education pedagogy.

Section C: Dr. Paul Servé, Professor of Chemistry and Biochemistry

The overall process of developing collaborative teaching programs between the College of Education and Human Services (CEHS) and the College of Science and Mathematics (COSM) at Wright State University (WSU) has been one of evolution. To attempt to envisage how WSU has arrived at the position that exists today requires understanding the historical perspective.

HISTORICAL PERSPECTIVE

In the early 1990's the CEHS was teaching Mathematics and Science (M&S) courses using a combination of adjunct and instructor faculty. In 1992 a crisis situation arose in the CEHS with the loss of instructors and a difficulty in finding adequate adjunct faculty.

Another concern was the steady rising of complaints regarding the educational preparation of students in grades K-12. People felt that teachers were not sufficiently prepared in the content of many disciplines, especially mathematics and science. Since the United States and Ohio economies were becoming more technologically based and requiring a steady supply of graduates versed in the areas of mathematics and science, it was imperative that newly trained teachers become well-prepared in the content of mathematics and science and be able to encourage young students who had a natural proclivity for these areas. [It is well-known that ignorance of a subject can lead to fear of the subject and that teachers are in a position that they could subconsciously convey this fear to their students. Moreover, teachers well-based in mathematics and science content, could stimulate and motivate young students who showed a natural aptitude for these areas.]

At WSU, the Deans of CEHS and COSM arrived at a unique solution to the conundrum. Courses specifically aimed at K-8 education majors would be taught in the COSM by faculty who held at least a Masters Degree in the subject area. When this solution was first proposed, a potential difficulty was faced by the CEHS, namely, the loss of student credit hours. WSU is a State of Ohio University and as such qualifies for State subsidy that is based upon several factors, one of them being student full-time equivalencies (FTEs). Discussions with the provost helped alleviate that problem. Since the state subsidy is greater for courses taught in the COSM than in CEHS, the university, overall, would gain additional subsidy monies. The CEHS would be held financially and staff harmless for the loss of student credit hours since the university would be the ultimate beneficiary of the additional subsidy monies.

JOINT APPOINTED FACULTY

The CEHS and COSM have collaborated to redesign the mathematics and science teacher preparation programs in an effort to review the pre-college M&S sector. This commitment to redesign M&S teacher preparation programs required the development of a new educational curriculum that included hiring faculty. It was decided that both the CEHS and the COSM would hire mathematics and science (M&S) education faculty and as such, hold joint appointments in the departments of Teacher Education (TED) and departments of Science and Math in the COSM. Currently there are 8 dual appointees. (Assuming a new Biology person is hired). When these joint faculties were hired they were presented with specific expectations. Additionally, new problems arose which had to be solved with the full support of the deans of CEHS and COSM and the concurrence of the provost.

Of principal interest to the jointly appointed M&S Educators were issues related to promotion and tenure (P&T). It was decided:

(a) The College in which the faculty principally resided (>50% appointment) would be the College which would originate the P&T document. The College in which the M&S educator had a <50% appointment would review the document and make relevant comments, but would only vote on the faculty's suitability for P&T at the University level.

(b) Criteria for P&T. The Dean of COSM was insistent that there be only one set of by-laws for each department. Thus, M&S educators would have to meet the minimum requirements for P&T that were set down for other members of the COSM department. Latitude in the area of scholarship for M&S educators was broadened. Instead of a minimum of 4 papers published in peer-reviewed journals, which was required for regular M&S faculty, M&S education faculty would have their scholarship evaluated in a broader manner (sense). M&S faculty must have a minimum of 2 papers published in peer-reviewed journals. Additionally, they may demonstrate a significant record of successful grant activity. Unfortunately, service is expected in the COSM, but it is rarely given much consideration at P&T time for regular M&S faculty. The scholarship of Service for M&S education faculty with respect to monitoring prospective teachers as they perform their practicum was noted and accepted.

(c) Departmental Stature - Since many of the joint appointed M&S educator faculty in the COSM regularly teach courses in the discipline, in addition to the content-based education courses, they are frequently welcomed as regular department faculty. Unfortunately, there exist COSM faculty who consider themselves discipline purists and may subconsciously look upon the M&S educators as second-class citizens. With the COSM dean and chairs support this equalitarian approach is slowly disappearing, as more

of the M&S educators become tenured in the COSM. As of today all 5 of the jointly appointed M&S education faculty who have been put up for consideration for P&T have been approved without difficulty.

TEACHING COMMITMENTS

The initiative to improve science and mathematics teaching preparation required faculty to develop courses that incorporated many of the content and pedagogical recommendations of the National Council of Teachers of Mathematics Curriculum and Evaluation Standards for School Mathematics, the AAA's Project 2061, the National Research Council's National Science Education Standards the Association for the Education of Teachers in Science Professional Knowledge Standards for Science Teacher Educators and the State of Ohio's competency-based mathematics and Science models.

With the advent of the new State of Ohio licensure program for newly graduated teachers and the dividing up of K-12 Education into early childhood (grades K-3), Middle Childhood (grades 4-9) the WSU M&S education faculty have fine-tuned the program as illustrated below. For the past 6 years the mathematics and science education programs for elementary education majors at WSU have included specially designed substantive courses for teachers that integrate lecture and laboratory within inquiry and cooperative learning environments. The courses are aligned with state and national standards and model pedagogical methods, in addition to including pedagogical knowledge components. The current Early Childhood program is similar to the old elementary education sequence and the new Middle Childhood program includes these courses as a base. For Middle Childhood education majors, concentrating in mathematics or science, additional 24-quarter credit hours in the discipline is required. WSU M&S education faculty have designed these courses so that they are not only congruent to learned society

guidelines, but are also matched to licensure requirements and will prepare students for the PRAXIS exams. Furthermore, in accordance with the standards, the courses are project and issue based in nature. To achieve this goal, the COSM M&S education faculty collaborated, not only between CEHS and COSM, but also across disciplines in COSM. This close working environment between the M&S educators has led to courses that have an interdisciplinary component.

MASTER OF SCIENCE TEACHING PROGRAM

The M&S education faculty over the past decade has organized Summer Workshops for current In-Service teachers. These Workshops, which tend to be interdisciplinary in nature and are taught using an Inquiry or Discovery based approach, are frequently team-taught. These workshops are designed to meet the M&S needs of teachers who are presently in the Middle Childhood grades. Based on conversations with these In-Service teachers, it has been determined that middle grade level teachers not only need a broad understanding of mathematics and science content, but also a more in-depth understanding of this content than the Early Childhood generalist does. Challenging and substantive courses that produce deep conceptual understanding are needed. Additionally, this content understanding should be acquired within learning environments using pedagogical methods recommended by the standards. Courses that produce in-depth, standards-based conceptual and pedagogical content understandings utilize inquiry and cooperative learning environments with problem centered contexts that focus upon real-life applications with personal and social relevance. These courses help address the needs of Middle Childhood level teachers for a strong, practical understanding of how to integrate science, mathematics and technology with consideration of how young adolescents learn

cognitively, socially and psychologically, so that instructional methods can be adjusted to meet the diverse needs and backgrounds of their future students.

The voiced desire of many in-service teachers to seek courses, that meet the goals stated above, has motivated the COSM to begin in the Fall of 2001 a recently approved Master of Science Teaching (MST) degree, aimed specifically at Middle Childhood teachers. In the MST degree program students will take 36 hours of interdisciplinary mathematics and science courses in the COSM and 12 hours of relevant pedagogically based courses in the CEHS.

In summary the creation of the jointly appointed mathematics and science education faculty and the teaching of the mathematics and science courses have had the following positive benefits.

a) The mathematics and sciences content background of newly graduated elementary school teachers has been strengthened.

b) A closer working arrangement between faculty of the CEHS and COSM has developed.

c) The frequent exchange of information between faculty in the CEHS and COSM has fostered a better understanding of the goals of the two colleges.

d) Ultimately, a better educated student population. The students are the ultimate winners of this program.

e) A potential virtual center involving education is housed both in the COSM and the College of Liberal Arts.

Section D: Reflections on Tenure and Promotions: Dr. Charles Ryan, Professor and Director, CEHS Graduate Studies

The Tenure System, or other alternative assessment systems, has been subject to criticism

from the standpoint of how faculty productivity is determined. Generally speaking, the purpose of the section is to review several critical variables related to tenure and faculty productivity that may provide guidelines for practice at selected institutions. By developing a model of general standards for productivity analysis, a descriptive picture can be developed that provides an empirical basis for examining what is meant by faculty productivity. The second purpose of the section is to comment on joint appointments between a professional college and an academic college where standards for promotion and tenure do differ. In short, this section of the paper will explore the complex association between tenure and faculty productivity, as it is associated with joint appointments between a professional school and an academic unit.

Prior studies by my research team on the issue of tenure and promotion examined a variety of professional viewpoints in area of higher education sources. A purposive sampling of selected literature sources from higher education from the period of 1995 – 2000 was obtained through electronic procedures and analysis of articles, faculty handbooks and other sources. A number of critical variables were identified and after analysis of the data a number of themes emerged which provided visible linkage to concerns, positions and opinions regarding granting tenure.

In evaluation for promotion to tenure, they are both matters of fact and unobtrusive factors that are difficult to assess. The role of faculty in American higher education varies by complexity, size of faculty, organizational structure, context variables, and teaching vs. research commitment. Also, there are other variables that professionals use to arrive at performance judgment. For instance, the college mission must be considered. The goals and objective of a College of Education faculty are typically related to varied assignments that require commitment to teaching, service, and administrative type duties.

A policy issue is developing a more effective model of evaluation that directs attention to field based activity is critical. As cited earlier, faculty with a joint appointment in a college of science and mathematics are expected to document publication of four articles in referred journals. While this is a laudatory requirement, it may not be relevant to colleges of education and human services that must document professional field supervision and teaching of clinical education faculty. These clinical requirements are extraordinary in their time demand and place constraints on faculty to deliver courses and supervision at off campus sites. However, it does not say that professional schools negate professional publication, but that we place a different value on the amount of published research and the sources it could be published in. For example, education faculty are expected to submit articles for potential publication and have at least six published when their credentials are submitted in the sixth year of the P&T review. These articles can be in journals that are heavily weighted to professional field activities and/or professional curriculum revision and new program standards. They do not necessarily need to be published in journals that have a strong emphasis on experimental and empirical based articles.

The review of promotion and tenure procedures and practices will continue as the debate intensifies throughout post-secondary institutions. As long as rhetoric is based on valued positions on selected individuals in either content unit, academic units or professionals schools, we will continue to have interpretations of tenure and promotions that may be in contrast to reality. The implications of our preliminary study suggests that the P&T process at the department level through the board of trustees is often impacted by differing values and interpretations while review of the candidate's tenure file is underway.

The implications of our collaborative efforts for the past eight years suggests that promotion and tenure will continue to be received favorably in this institutional environment.

However, we must continue to work on defining the standards that are used to assess faculty work who hold joint appointments. Several concluding recommendations are as follows:

1. Early and sustain review must occur for all candidates in an entry-level tenure track position. Performance appraisal on an annual basis should be conducted by institutional representatives at the department and college level to ensure the strengths and weakness are clearly identified and evidence of improvement is noted in subsequent years.

2. The assessment of one's professional potential for tenure must include review by colleagues within both departments from which the candidate is under consideration. It is extremely important that external review be used to substantiate the quality of teaching research and clinical service. Mere quantity of publication is not the key variable in this issue. However, quality as related to theoretical judgment must be demonstrated in publications that focus on professional practice.

Summary

We continue to believe that the issue of promotion and tenure will consume many hour of productive work by promotion and tenure committees and selected administrators as we analyze candidates for the critical professional point in their lives. We believe that one's peers are best able to judge the candidates for promotion and tenure and the overall quality of their work while holding a joint appointment.

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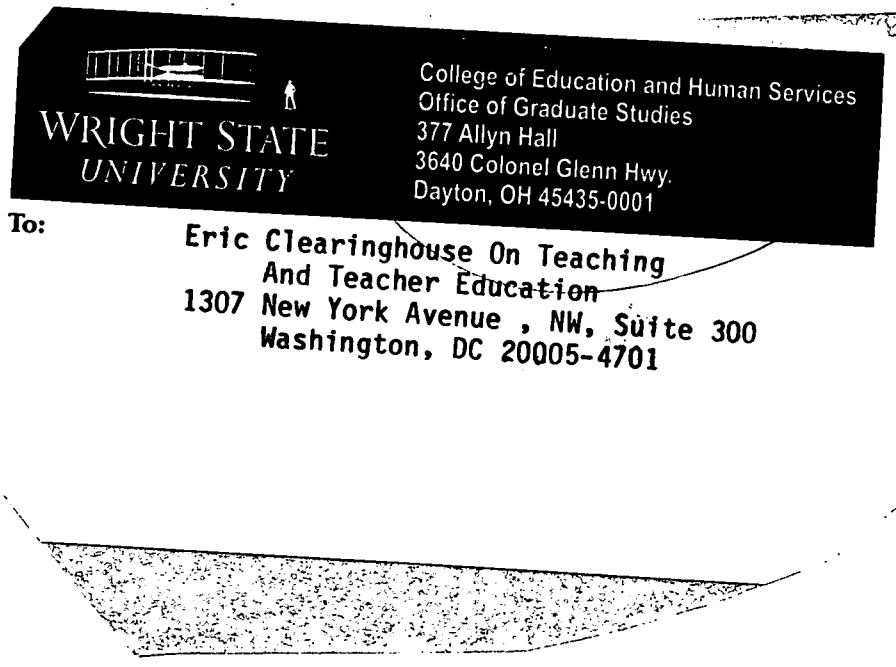

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