SPECIAL EDITION

AJOSE
AFRICAN JOURNAL OF STUDIES IN EDUCATION

VOL. 9, NO. 2, NOVEMBER 2013

ISSN: 0189 – 241 X

IMPROVING TEACHERS' CONCEPTUAL CHANGE THROUGH MENTORING STRATEGIES: IMPLICATION FOR QUALITY SCIENCE TEACHING

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Abstract
That there exists a relationship between the quality of science classroom deliveries and the quality of science learning as well as the quality of science products from our schools is no more a hidden fact. Quality science teaching taps on the teacher's pedagogic competence as well as his knowledge of subject matter. This study investigated the effect of mentoring as a tool for helping science teachers improve their competence in science teaching. Thirty biology teachers from two local government areas in Delta state in two groups (N = 12 and N = 18) formed the sample of the study. The experimental group (N = 12) was mentored by an experienced biology teacher for ten weeks on concepts in biology that teachers confessed they dreaded, new methodologies in biology teaching, preparation of lessons, field practicals laboratory activities, and effective classroom climate. The control group was not mentored. Data were collected using the Test of Biology Content Knowledge (BCK) for teachers and a questionnaire of Teacher's Perception of his Practice (TPP) and analyzed using means, standard deviation, t-tests and graphical representation. Results showed a significant effect of experimental treatment on teachers' competence but not in teachers' knowledge of content or subject matter. Recommendations for effective incorporation of mentoring into teacher life-long learning and competence development programmes within the quality teaching paradigm were made.

Introduction
The business of teaching is quite tasking as it involves guiding and directing the part of knowledge construction, acquisition, and domestication. Teachers occupy strategic position in this process. Their knowledge and understanding of concepts, "theories, and principles in relation to the belief of the science community guide the particular teaching strategy they adopt and the teaching sequence which they employ. Literature (Mullen, Cox, Boettcher & Adoue, 1997) has called for new patterns of teacher education that utilize mentoring as a means of improving teachers' teaching practice. Because of the complexities and multidimensional processes involved in guiding, teaching and influencing inherent in mentoring Ackley & Gall (1992) said mentoring precisely has remained problematic.

However, some notable definitions exist in literature. Whitely, Dougherty and Dreher (1991) explain mentoring as an interpersonal relationship that influence career progress while Turban and Dougherty (1994) see it as a set of activities which include coaching, support and sponsorship, that upper-level managers provide to protégé. Kram (1985) had earlier defined mentoring as "relationship between a younger, less experienced person (called Protégé) and an older, more experienced adult (called mentor) who helps the less experienced individual learn to navigate in the adult world of work". It is important to note here that the idea of age as a determinant of who becomes a mentor has been a subject of controversy as experience and status have been found to be more relevant. Hence, there is the existence of peer mentoring and even younger people who mentor adults on account of their superior experience and status. From the Nigerian perspective, Okarume (2011) defined mentoring as a close, developmental relationship between two people in which a partner willingly avails him/herself of the full range of superior experience, knowledge, skills or status of the other partner in all spheres of human endeavor(p 39).In the classroom situation, two types of mentoring exist: generic mentoring (Mcintype, Hagger & Wilkin, 1993) which focuses on developing key aspects of teaching practice and specific subject mentoring which facilitates the development of pedagogic knowledge and content-related knowledge appropriate to activities in specific subjects (Jarvis, Mikeon, Coates & Vause, 2000; Peterson & William,1998;Faiman-Nemser & Parkier,1990).

Mentorship and knowledge change

Information available on how learning occurs has revealed that learning is not an accumulation of bits of information but an active, interactive, connective process that requires changes of different kinds, such as addition, linkage, rearrangement, and exchange (Hewson, Beeth & Thorley,1998). This notion of how learning occurs especially in science has been tagged "learning as conceptual change". Strike and Posner(1985) and Hewson, Beeth and Thorley (1998) explicated a conceptual change model which sees learning as consisting of two concepts: status (ie the degree to which a holder of an idea knows and accepts the idea and which is determined by the intelligibility, plausibility and fruitfulness of the idea to the holder) and conceptual ecology (which deals with an individual's realization that the knowledge he holds is of different kinds, his ability to focus attention on interaction between them as well as identify the role which these interactions play in supporting some and discouraging others) (Hewson,Beeth&Thorley,1998).In the context of biology teachers' competence, the teachers' knowledge status and conceptual ecology (conceptual change) affect not only his level of cognition but his conviction about its authenticity. This is the link between cognitive and motivational components of learning. Motivational component of learning, according to Pintrich, Maarx and Boyle (1993) cited in Hewson, Beeth and Thorley (1998) is mediated by such affective elements as goal

orientation, values, efficacy beliefs and control beliefs. These elements set the stage for teachers to apply and teach science (biology particularly) within the guidelines of teaching for conceptual an adequate social and cognitive classroom climate.

Allsop and Benson (1996) identified the importance of the school setting in achieving knowledge change using the mentoring tool. Hudson, Skamp & Brooks (2007) expressed the view that possession of pedagogic knowledge by mentors is key in successful mentoring while its omission reduces quality of experiences accruable to mentees from mentoring process. Hudson (2007), after a review of literature on mentoring, identified the following ten attributes associated with pedagogic knowledge that could be affected by mentorship:

- Planning for teaching (Jarvis et al 2000)
- Timetabling (Williams 1993)
- Preparation
- Teaching strategies
- Classroom management
- Questioning skills
- Assisting with problems solving
- Content knowledge
- Implementation
- Assessment providing viewpoint

Hudson further articulated five factors for mentoring from his review of literature. These are:

i. Personal attributes that the mentor needs to exhibit for constructive dialogue
ii. System requirements that focus on curriculum directives and policy
iii. Pedagogical knowledge for articulating effective teaching practices
iv. Modelling of efficient and effective practice
v. Feedback for the purpose of reflection for improving practice

Roth. (1998) used some propositions and heuristics for assessment of teachers' knowledge and classified it into three groups-subject matter knowledge, pedagogic content knowledge and general pedagogic knowledge. The assumption is that there exist some standard performances and activities which are expected of teachers upon which their knowledge and performance can be assessed. They also recognize that some inherently tacit knowledge exists which can only be assessed when compared with mutually recognized expert knowledge and science community accepted behaviours. However, authentic teaching and authentic teaching practice are not only domain specific but also situational. There are some aspects of science teaching and teaching generally that are impossible to teach because of the tacit elements inherent in them. These tacit elements are embodied in the practice of experienced practitioners in the field (Bourdieu &Wacquant 1992). Roth (1998) analysis of the dilemmas of teaching science teaching in

didactic ways reveals that ‘excellence or practical mastery ceases to exist once people start asking whether it can be taught as soon as they seek to base 'correct' practice on rules extracted for the purpose of transmission...'(Roth,1998:172). In his view, other dilemmas facing science teaching are those of inadequacy of methodology courses to transmit the essence of the practice which they were designed to develop in students, the inadequacy or inability of measurement techniques to capture the tacit aspect of 'masterful practice' in science teaching and the dilemma that students must engage in the practice of science teaching before they can make sense out of the language and practice of old-timers in the field of science teaching. His suggestion is that practice of science teaching should include the induction of students into the community of science teaching practitioners after they have started to participate in the practice of science teaching. In other words, development of knowledge and skills in science teaching are not all couched in theoretical classroom discourses but that some essential elements which beginners need to acquire are practice-based and learnt from experienced practitioners. The thinking to the researcher is thus directed to the possibility of using mentoring tool in helping biology teachers improve the quality of their teaching practice as well as improve their cognition of science knowledge. This is the focus of this study.

Quality in science teaching

Quality in teaching demands that teachers' classroom practices provide adequately for students to develop Meta cognitively (Moemeke, 2011). Baird (1998) explains that only teachers of science whose knowledge is Meta cognitive can guide students to learn science meta-cognitively. This is important in order for them to know about the nature of effective teaching, to be more aware of the purpose and progress of current teaching, and to control their teaching more effectively by making productive decisions (Baird, 1998; Oliver, 2007). In Baird's belief, effective teaching results from a teacher's conscious, focused and systematic reflection of his personal practice which should be anchored on collaboration. Collaboration in this sense entails co-participation in a practice alongside an experienced practitioner who guides, models, scaffolds, provides feedback, and corrects when need be (Bourdieu &Wacquant,1992). This is made more important if we understand that the science teacher belongs to two communities: one that transcends subject matter boundaries and another, as representative of the scientific community with intellectual practices that are domain specific. For such teachers to function appropriately in both spheres, the need for cognitive apprenticeship for teaching the practice of science teaching in the canonical ways may provide the answer towards quality science classroom deliveries.

Literature is replete with benefits of mentoring in both academic and organizational set ups. Its effectiveness in improving social interaction between mentor and mentee (Fields, 1996), increased power and influence on the mentee

(Fugenson 1998), career development, of protégé (Okediji, Nnedum & Okediji, 2011), protégé development of sense of competence and effectiveness are but a few. In academic circles, mentoring has been found as effective in providing guidance and support towards, the achievement of professional development (Darke, 2004; Barkham, 2005; Ofovwe & Aabontaen-Eghafona,2011). The efficiency of such a mentoring tool in Nigerian science teaching setting needs to be understood in comparison with its effect on other science teachers.

Statement of the Problem

In most professional fields of practice, like medicine, nursing, engineering and even banking, young recruits practice under the headship of experienced and senior practitioners from whom they learn the intricacies of the practice. This is in complete contrast with what obtains in science education practice. Young recruits into the science classrooms are left to act, think, and navigate through the problematic waters of science teaching away from their peers as they are considered as masters of their own classrooms. Such new science teachers are left to rely on their theoretical knowledge of pedagogy and content without guide. Roth (1998) had stated that methodology courses are oxymoron as they miss the very essence of the practice which they are designed to develop in students. Gcourel (1990) and Hutechines (1995) have explained that since, the practice of science teaching is domain specific and situational, new comers into the field are expected to pick up the non-articulated knowledge of practitioners as they associate with them over time. This inducts them into the science teaching community since they will at a time become old timers. Such science teaching communities have members with different expertise and competence levels that may overlap at some points. This becomes a firm base for development of professionalism through mentoring. The question which this study is meant to address is: “Will mentoring of biology teachers improve their knowledge of science content and pedagogic practice"? The search for possibilities for improvement of quality of science teaching practice is a necessity for production of quality scientists of the 21st century.

Second to this is the position of Sweeney (2004) in Otovwe and Agbontaen –Eghuforna (2011) that mentoring is pne of the best tools for "reducing stress for novice teachers, orientation to curriculum and promoting the creation of better norms of collegiality and collaboration. “Even with this assertion, Underhill (2005) in Ofovwe and Agbontaen-Eghafona (2011) had earlier reported that only 22% of studies on mentoring compared characteristics and outcomes of mentored versus non-mentored individuals: This dearth of empirical evidence is even more obvious in Nigerian academic setting (Okurame, 2008),hence this attempt for empirical evidence is an obvious need.

Research questions

The study was designed to answer the following questions

1. Is there any difference in the pedagogic competence of biology teachers who were mentored and those who were not?
2. Is there any difference in the content knowledge of biology teachers who were mentored and those who were not?

Research hypotheses

The following null hypotheses were tested in the study

1. There is no significant difference in mean performance of biology teachers on biology content by those mentored and those who were not.
2. This is no significant difference in the mean level of pedagogic competence of biology teachers who were mentored and those who were not.

Purpose of the study

There is a growing need for alternative tools for ensuring continuous and life-long development of teachers as professionals. The need for teachers to possess enough knowledge to meet the changing science and technology environment of today's world is very important for production of efficient young scientists. Only trained science teaching professionals will be able to meet the classroom needs of developing nations like Nigeria. This study explores a new terrain for fostering effective teacher continuous learning and development.

Significance of the Study

A result of this study is expected to open new possibilities for improving science teacher knowledge and competence for teaching in schools. The study will also provide empirical evidence of effect of mentorship on academic staff performance in institutions of learning.

Method of the study

Thirty biology teachers with 0-5yrs teaching experience in secondary school biology teaching were purposively selected from secondary schools in three local government areas in Delta state of Nigeria. 40% of these teachers (12) formed the experimental group. The experimental group was constituted into a study group that met with the Mentor for two hours a week to discuss concepts in biology which teachers dread, new methodologies in biology teaching, preparation of sample lesson, and field and laboratory activities for ten topics. Each participating teacher had access to the Mentor either by face to-face contact or through networking for interactions as necessary. The choice of the mentor was based on his experience of over 25 years of teaching biology, an author of two biology text books that are widely in use in secondary schools in the areas and a chief examiner of the practical aspect of biology in West African, Examinations Council (WAEC) summative examination for senior secondary schools. The relationship between the mentor and the 12 Mentees and among mentee was both academic and social. The other 18 biology teachers formed the

control group since no mentoring services was rendered to them. Instead, a manual covering the same areas which the experimental group was mentored on was given to the control group to study at their own convenience. At the end of a period of 10 weeks, a test of Biology Content Knowledge (BCK)for teachers consisting of one hundred multiple choice items with reliability of 0.70 by K.R. 21 and a questionnaire on Teacher's Perception of his Practice (TPP) were administered. The reliability coefficient of TPP was found to be 0.68 by Crombach alpha. The TPP is 'a 20-item four-point Likert instrument divided into four subscales-lesson preparation, use of instructional technology, classroom effectiveness, and extent of student's participation. Each of these subscales addressed major issues related to science teaching practice. Each subscale was addressed by five items in the questionnaire. Data collected from the exercise were analyzed using means and t-test.

Results

The results are presented in Tables 1-3.

Table l: Means and standard deviation of groups on the two indicators

Test	Experimental mean	SD	Control mean N = 18	SD
BCK	67.51	12.61	34.83	10.64
TPP	64.17	7.62	46.11	9.63

Table 1 showed that the mentored group (Mean =67.51 with SD =12.61) in biology content knowledge assessment produced better mean over the non-mentored group (Mean =54.83, SD =0.64) when their biology content knowledge was compared. This was also the case when the teachers' perception of their own teaching was compared. The experimental (mentored) group showed superior mean (mean = 64.17, SD =7.62) over the non-mentored group (mean =46.11, SD = 9.63).

In order to test the significance of the difference in these means, the t-test was calculated.

Table 2: t-test of significance of experimental and control groups in the three Measures

Group	N	Mean	SD	df	t_{cal}	t_{tab}	sig
Content knowledge							
Mentored	12	67.5	12.61				
Non-mentored	18	54.83	10.64	28	-5.21	2.048	*
Perception of Practice							
Mentored	12	64.17	10.64	28	2.95	2.048	NS
Non-mentored	18	46.11	9.63				
Teaching competence							
Mentored		117.49	16.22	28	3.22	2.048	NS

Non-mentored		89.18	14.26				

Table 2 which tested the significance of the difference in the means of the teacher's performance on knowledge about biology contents revealed that the calculated (t = -5.21 df 28) is far less than the table value of 2.048 at 0.05 level of significance. Hence, there is no significant difference in the biology content knowledge of biology teachers in the two groups. The null hypothesis that there is no difference in content knowledge by the two groups is thus retained. By implication, the difference in the mean score of Biology teachers in Biology concepts knowledge did not vary between the groups (mean = 67.5 and 54.83 for experimental and control groups respectively).

Hypothesis 2 which stated a no significance difference in the mean competence value of biology teachers in the two groups was tested. Table 2 showed a t-value of 2.96 which is larger than the table t-value of 2.048 at 0.05 level of significance. This means that the difference in the means of the two groups is significant and hypothesis 2 is therefore rejected. The experimental group (Mentored) produced higher means in their rated competence level (64.17) over the control (46.11) when all response ratings were pulled together. This difference was significant (t=3.23 df 28) at 0.05 level of significance.

In order to ascertain the source of significance of the difference, the means were taken on the basis of subscales.

Table 3: Biology teachers' scores on teaching competence grouped bythe four subscales.

SN	Subscales	Mentored	Non-mentored
1	Adequate lesson preparation	28.6	29.21
2	Instructional material sources	31.82	14.28
3	Classroom/class activities effectiveness	30.82	24.22
4	Class participation level	117.49	89.18

Table 3 showed that the mentored group produced higher means in three subscales (instructional materials sourcing =31.82, classroom activities =30.82 and participatory classroom = 26.25) over the non-mentored group (14.28, 24.22 & 21:47 respectively for the same subscales).

Discussion of Findings

The non-significance of the difference in means of biology teachers' content knowledge of biology concepts between the groups is quite instructive. Content or subject matter knowledge of teachers is controlled by individuals' mental abilities and intelligence. This, in turn, determines academic achievement in

science classrooms during teacher preparation programmes. A teacher's continuous growth
in content knowledge is therefore based on an individual's ability to seek for further knowledge through different training and retraining exercises. However, the practice of science teaching requires adequate knowledge and skill in science teaching. The significance of the difference between the groups in favour of the mentored group (experimental) is an indication that apart from knowledge of content, the level of competence of the teacher is of high importance (Ikegbunam, 2006; Afangideh, 2009; Ikpe,2005). Quality science teaching is practice-based and the importance of co-participation, collaboration, and guided apprenticeship in acquisition of salient aspect of practice are essential for its achievement. This is in line with the proposition of Roth (1998). The non-significance of the difference in knowledge due to mentoring found in this study is remarkable since there seems to be a dearth of evidence on the direct influence of mentoring on academic achievement.

Conclusion

The effectiveness of mentoring in helping science teachers improve their practice has been authenticated by the result of this study. Since science teaching practice is not only domain specific but also situational, there is the need for guidance especially for young practitioners to enable them marry theory of science
teaching with its practice. Situations that present themselves in the science classrooms are usually ones that make demands on the science teacher's reservoir of knowledge and experience. Experience comes as a result of long period of practice which is harboured by practitioners in the field whose idiosyncrasies which were developed over many years of practice have built up into tacit behaviours that are not easily teachable in theoretical classroom situations. They are only picked up while in association with the community of practitioners. Subject matter knowledge is teacher specific and influenced by factors that are cognitive and guided practice or mentoring has been found by this study not to affect it.

Recommendations

Based on the findings of this study, it is hereby recommended that science teaching and particularly biology teaching requires high competence level of teachers, if appropriate learning is to occur in learners. Since competence develops over time and in line with present day life-long developmental paradigm, the destiny of science learners should not be left in the hands of inexperienced science/biology teachers without guide. Just as learners are to construct knowledge in a social setting, science teachers should develop their practice within the social milieu under the guide and mentorship of experienced science teaching practitioners. It is also recommended that science teaching

professional associations such as Science Teachers Association of Nigeria (STAN),Chemical Society of Nigeria, Biological Science Association and other such associations should incorporate mentorship in their plan for members' professional development and career growth.

Ministry of Education and those of Manpower Resources and Labour should also open up channels for mentorship of science teachers, if quality science teaching desire of the nation is to be achieved. The role of Ministry of Science and Technology and the Teacher's Registration Council in assisting teachers in career development and professionalism should also be highlighted and recommended.

References

Ackley, B. & Gall, M. (1992). "Skills, Strategies and Outcomes of Successful Mentor Teachers. Paper presented at the annual meeting of the American Educational Research Association, San Francisco, CA.

Afangideh, M. E. (2009). Curriculum Implementation of the Basic Education Level. In U. M. OIvowi; K. Nwufo et al (eds) Curriculum theory and practice. Curriculum organization of Nigeria (CON). 108-179.

Allsop, T. & Benson, A (1996). Mentoring for Science Teachers. Bristol, P. A. Open university press.

Baird, J. R. (1998). "A view of Quality in Teaching."In B. J Fraser and K.G. Tobin (eds) *International handbook of Science Education*. London, Klewer Academic Publishers.

Bourdieu, P. & Wacquant L.J.D(1992).An Invitation to Reflexive Sociology, Chicago, IL University of Chicago Press.

Bukham, J. (2005)."Reflections and Interpretations on Life in Academia: A Mentee Speaks."Mentoring and Tutoring, 13(2) 331-344

Clarke M (2004). "Reconceptualizing Mentoring: Reflections by an Early Career Researcher."Issues in educational research 14 (2) 121-143

Fagenson, E.A. (1998). "The Power of a Mentor: Protégés and non protégés Perceptions of Their Own Power. Group and organizational studies, 13 (2) 184-194.

Feiman-Nemser, & Parker, M. B.(1990)."Making Subject Matter Part of the Conversation in Learning to Teach". Journal of Teacher Education, 41(3)32-43.

Fields, C.D. (1996) "Black Peer Mentors Cooperative Advocacy Beneficial to Morale."Black issues in higher education, 13-24.

Gcourel, A.V (1990) Critical Discourse Analysis. The Critical Study of Language. New York, Longman.

Hewson, P.W., Beeth, M. E & Thorley, N. R (1998)."Teaching for Conceptual Change". In B.J Fraser and K.G Tobin,(Ed).International Handbook of Science Education, London, Kluwer Academic Publishers,199-218

Hudson, P. B(2007).“From Generic to Specific Mentoring: A five Factor Model for Developing Primary Teaching Practice."European Journal of Teacher Education, 27 (2) 139 – 146 Online version.
DOI: 10.1080/0261976042000223015

Ikegbunam, C.I(2006). “Teachers' Classroom Instructional Practices and Their Knowledge of National Policy Provision for Primary Education in Nigeria.” Nigerian Journal of Curriculum Studies, 13(1),84-94.

Ikpe, U. G. (2005). The demands of a modern teacher. Uyo: Billy publisher

Kram, K. E (1985). “Mentoring at work: Developmental Relationships in Organizational life”, Glenview Scott, Foresman and Co,11

Mclntyre, D., Hugger, H, & Wilkin, M. (1993). Mentoring: Perspectives on school-based teacher education. London, Kogan page.

Moemeke, C. D (2011). “Using ICT Tools in the Overcome of Cognitive Conflicts in the Learning of Science Concepts: Implication for Quality Teaching Paradigm." Proceedings of International Conference of Faculty of Education, Delta State University, Abraka,9-13 August,88-94

Moemeke, C.D., Onyeagu, F.O. & Nwaham, C.O. (2012).“Effects of Mentoring and Teaching Practice Projects on Nigerian Primary School Teachers Competency Development: Implication for Quality Teaching”, *Proceedings of the Conference of ICERI*, held in Cambodia.

Mullen C., Cox, M., Boettcher, C., & Adoue, D. (1997). Breaking the Circle of One Redefining Mentorship in the Lives and Writings of Educators. New York, Peter Lang.

Okediji, A. A, Nnedum, A. O. U & Okediji, E.A.(2011).“Mentoring and the Work Related Outcome Constructs: A Conceptual Review.” In A.A Olowu, (ed) “Mentoring: A Key Issue in Human Resource Management. Ife Centre for Psychological Studies, 277-299.

Okurame, D. E (2008).“Mentoring in the Nigerian Academia: Experiences and Challenges."*International Journal of Evidence Based Mentoring and Coaching,* 6(2),45-56.

Okurame, D. E (2011). “Mentoring in the Nigerian Context.” In A. A Olowu, (Ed). Mentoring: Key Issue in Human Resource Management. Ife Centre for Psychological Studies, Ile-Ife

Oliver, R. M (2007). Effective Management: Teacher Preparation and Professional Development. National Comprehensive Centre for Teacher Quality

Ofovwe, C. E. & Agbontuen-Eghaffona, K.E (2011). “Mentors and Mentoring Amongst Academic Staff in Nigerian Tertiary Institutions: A study of University of Benin, Edo State.”In A.A Olowu,(ed).Mentoring: A key Issue in Human Resource Management. Ife Centre for Physiological Studies/Services,200-232..

Peterson, B. E. & Williams, S. K (1998). “Mentoring Beginning Teachers." Mathematics Teacher,91(8)930-734.

Ramsey G. (2000).“Quality matters: Revitalizing Teaching: Critical Times, Critical Choices. "Sydney, NSW: Department of Educational Training Board of Studies.

Roth, W. M (1998). “Teaching and Learning as Everyday Practice”. In B. J. Fraser and K.G. Tobin (1998). International Handbook of Science Education, London Kluwer Academic Publishers,160-181.

Strike, K. A & Posner, G. J (1985) “A Conceptual Change View of Learning and Understanding.” In West, A. L & Pines, A. L (Eds) Cognitive Structure and Conceptual Change. Orlando FL Academic press.

Jarvis, T., Mikeon, F., Coates, D & Vause, J (2001). “Beyond Generic Mentoring: Helping Trainee Teachers to Teach Primary Science”. Research in Science and Technological Education, 19(1), 5-23.

Turban, D. B & Dougherty, T. W (1994). “Role of Protégé Personality in Receipt of Mentoring and Career Success", Academy Management Journal, 37, 688- 702

Whitely, W., Dougherty, T.W & Dreher, G.F(1991). "Relationship of Career Mentoring and Socioeconomic Origin to Managers' and Professionals' Early Career Progress", Academy of Management Journal,34,331-335.

Williams, A.(1993).“Teacher Perceptions of the Needs as Mentors in The Context of Developing School-Based Initial Teacher Education”. British Educational Research Journal,19(4),407-420.