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Locus of control as a predictor of academic attitudes among secondary school science teacher trainees at a public university in Uganda

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A host of factors often determines academic attitudes among learners. This quantitative study using cross-sectional survey design was conducted to establish the prediction effect of locus of control on academic attitudes among secondary school science teacher trainees at a public university in Uganda. Data were collected from a census of 203 students using structured questionnaires comprising a biodata section, Locus of Control Scale and Academic Attitudes Scale. Analysis was done using SPSS, and information was presented in tables and later described. Results showed that the trainees used mainly external locus of control and had generally moderately negative academic attitudes. Locus of control significantly predicted academic attitudes ($t = -2.595, p = .010$). Further analysis revealed that there was a statistically significant difference in academic attitudes between students originating from rural areas and those from urban areas. It was concluded that the use of external locus of control shifted responsibility of academic issues from the students to other external causes which likely resulted in counterproductive view the science and hence negative academic attitudes among the students. It is recommended that trainees need to be educated before and during pre-service training to appreciate teaching as a noble profession, and that trainees with the right disposition should be selected at entry to preservice training so as to foster the needed changes in science and technology education for national socioeconomic transformation.

Key words: locus of control, attitude, science teacher, secondary school, and trainee

INTRODUCTION

The World Bank and the United Nations acclaim academics as a critical pillar of human social and economic development (Jibril, 2004). Hence world over, governments and states have institutionalized the pursuit of academics in order to achieve national development. Teaching and learning have thus been structured into curricula that specify the content to be mastered by a certain category of learners in a specified period. More so, many nations have attributed their economic transformation to the advancement in technology which is achieved through the

study of science subjects: physics, chemistry, biology, plus mathematics (Bitamazire, 2009; Seki, 2009).

In a bid to create a critical mass of scientifically and technologically literate populace, the government of Uganda made science subjects and mathematics non-optional at ordinary level of secondary education (Asiimwe, 2016; Kariisa, 2015; Ssebbunga-Masembe et al., 2013). This, in addition to the universal secondary education, brought fresh challenges of increased science and mathematics class sizes with associated demands on the teacher to

constructively deliver activity-based lessons. Given the fact that fresh graduate teachers often feel ready enough to handle professional demands, but are not well equipped with hands-on and minds-on skills during preservice training to handle the dynamic learning situations, the Government of Uganda instituted the Secondary Science and Mathematics Teachers (SESEMAT) Programme in 2005 for skills-revival and development of all in-service teachers of science and mathematics (Asiimwe, 2016; Kariisa, 2015). This aimed at continuous professional development of science and mathematics teachers. All inservice science and mathematics teachers are obliged to attend the trainings to acquire these skills and actually impart them during the teaching/learning process.

The propensity of the teachers to appreciate the inservice trainings can be presaged during preservice training. The pertinent predispositional factors that underlie teacher trainees' acquisition and implementation of policy demands include locus of control and academic attitudes (Lease, 2004). Locus of control is a person's belief whether she or he has the power to control her or his own destiny and to determine her or his own direction in life or not (Rotter, 1966). On the other hand, academic attitudes are complex mental states involving beliefs, feelings, values and dispositions to act in certain ways in response to academic demands (Lewis, 2007).

Previous studies (e.g., Carden et al., 2004) indicate that a positive academic attitude correlates with internal locus of control, whereas a negative academic attitude correlates with external locus of control. Teacher trainees who use external locus of control are thus more likely to attend trainings for the sake of fulfilling an obligation without any passion for fostering the academic gains of the learners (Abar et al., 2009; SESEMAT, 2005) who are envisioned to cause future development in the economy and technology of the nation (Hanushek, 2011). Such teachers should be identified before or during pre-service training and remedial action taken before they graduate and join the profession (The Sutton Trust, 2011) if value for money is to be realised.

In the selected public university in Uganda, the teacher trainees exhibited high failure rates as well as retakes in courses. This trend of performance indicated a flaw in the dispositions of the students. Hence the researchers presumed that the students had mainly external locus of control and negative academic attitudes. It was hypothesised that there was a negative correlation between the students' locus of control and academic attitudes, and that the locus of control would predict the students' academic attitudes.

Literature Review

Levels of Locus of Control and Academic Attitudes among University Students

Personal attributes and qualities transcend skills and capabilities in importance because graduates need the

attributes and qualities to respond to an unknown future (Mouldoon, 2009). Students' future expectations and emotional reactions are influenced by their causal attributions, which in turn influence their current academic achievement outcomes (Weiner, 1986). One of the causal dimensions, which greatly influence the students' academic performance level, is locus of control. Locus of control is a psychological construct, which originated in Social Learning Theory, which attempts to integrate concepts from both the behavioral and cognitive schools of learning theory (Rinehart, 1995).

The term locus of control refers to the site of a cause, that is, whether or not the outcome of an event is attributed to something inside (internal to) or outside (external to) the person involved (Rotter, 1954, 1966; Strickland, 1978; Tones, 1997; Weiner, 1986). Locus of control relates to people's attitudes, emotions, health, and motivation, as well as behavior in organizations and educational institutions (Spector and Fox, 2005). Rotter's (1966) generalized locus of control scale has been adapted to measure attributions in various settings. These settings include work locus of control (Spector, 1988) and health locus of control (Wallston, 2005). In addition, scholars (e.g. Russ, 2006; Strickland, 1978) have modified the construct to include internality (I), externality due to more powerful others (P), and externality due to fate (C). However, the current study employed Rotter's (1966) generalised locus of control scale containing 26 items; 13 for measuring internality, and 13 for externality.

Locus of control forms during childhood and stabilizes during adolescence; and it depends on various experiences the individual goes through including culture, religion, societal influence, sex, age, and training (Gaa and Shores, 1979; Krampen and Weiberg, 1981; Türker and İnel, 2012). Rotter (1966) hypothesized that an individual develops a generalized expectancy of control when reinforcement is perceived as contingent on his or her behavior. Behaviors that result in reinforcement serve to strengthen an individual's perception of control. On the other hand, when reinforcement fails to occur, the generalized expectancy will diminish or extinguish (Gifford et al., 2006). It is therefore important to identify students' locus of control to advance remediation in their academic attitudes where necessary (Anastasi, 1990).

An attitude is a complex mental state involving beliefs, feelings, values and dispositions to act in certain ways (Lewis, 2007). A student may have positive or negative feelings towards certain aspects of his or her academic work. The sum total of these feelings produces a positive or negative attitude towards academic work. A positive attitude reflects a positive emotional disposition in relation to the subject and, in a similar way, a negative attitude relates to a negative emotional disposition (Zan and Di Martino, 2008). According to Eshun (2004), these emotional dispositions influence an individual's behavior, confidence, or willingness to learn. A positive attitude fosters hard work and consequently high academic achievement, while a negative attitude causes low academic work readiness and

hence low achievement in academics (Weiner, 1986). In other words, the attitude determines the work readiness at the university.

A university is a large and diverse institution of higher learning created to educate for life through teaching and research; and for a profession, and to grant academic degrees (Lewis, 2007). Society widely considers individuals to be only as worthy of employment as the quality of their academic transcripts (Covington, 2000), especially from universities. Hence, the kinds of grades graduates achieve are the unmistakable measure by which the graduates' work readiness and employability worth are rated.

Similarly, Jibril(2004) and Moss et al. (2006) noted that high academic achievement at primary and secondary school was considered by popular opinion to be a precursor for "good" programmes at the university. A good programme is then tagged to perceived good employment opportunities for the graduates. Therefore, many school managements and administrations, parents, teachers, and guardians groom their students to build an attitude towards excellent performance especially at primary and secondary schools (Jibril, 2004; Oh, 1999). This grooming entails a teaching and learning process characterized by didactic teaching, rote learning, lessened co-curricular activities, serious supervision, and programmed career guidance and counseling (Farrant, 1980). There are also constant reminders, for example, by ringing bells and frequently making announcements at all opportunities. Any deviant behavior is usually punished heavily.

Some schools, parents/guardians and their wards go to the extent of manipulating circumstances in order to force high academic achievement of their children (Alutu and Aluede, 2006). This is manifested in examination malpractices, bribery, and cramming the learners. Thus, the students end up graduating without possessing the abilities for which they were examined (Fasasi, 2006; Nanna, 1997). Such a system of education imparts in the learners the attitude that academic excellence, regardless of how it is achieved, is less a matter of studious effort than using cheap immoral means of academic achievement.

Such an attitude to academics does not help the students at the university where they are expected to follow university rules and regulations, timetables, observe deadlines, and relate well with colleagues and university staff without being reminded(Moss et al., 2006). Yet the students are free to programme themselves as they wish. Hence the students at firstface stressors including romantic problems, time pressures, academic difficulties, assorted social problems, and alienation from academics (Moss et al., 2006; Nakalema and Ssenyonga, 2014).

In order to meet some of their financial needs, some students indulge in working for money during the semester (Csikszentmihalyi and Schneider, 2000).This is accompanied with the danger of emphasizing the employment and other non-academic issues at the expense of studies. Resultantly, the readiness to do academic work becomes further impaired. In order that the students adjust to the stressors and simultaneously better their academic

work readiness, they often appraise among other factors their personal attributes such as locus of control. If they feel in control of outcomes in their studentship, then they develop positive academic attitudes. Otherwise, negative academic attitudes prevail with resultant failures, retakes, and malpractices.

Relationship between Locus of Control as a Predictor of Academic Attitudes among University Students

There are various important educational implications of locus of control in the academic achievement of university students. For instance, locus of control strongly influences the decision to invest in education (Coleman and DeLeire, 2000). This is in accordance with the expectancy theory or theory of reasoned action of Vroom(1964) as cited in Ajzen and Fishbein (1980), which asserts that work motivation is a function of two expectancies: that effort will lead to performance, and that performance will lead to valued outcomes. Students who believe that the likelihood of finding a high paying job depends little on their human capital investments but more on luck, fate, or other "external" factors might be more likely to drop out of school or fail to concentrate on their studies. On the other hand, teenagers who believe that their human capital investments or other "internal" factors will have a strong impact on their future opportunities might be more likely to complete school or attend college/university (Ajzen and Fishbein, 1980). Hence, students in university should use internal locus of control and be able to make educational investments by exhibiting high academic work readiness.

Another theory that explains the influence of locus of control on academic work is the achievement goal theory (Dweck, 1986). According to the theory, students are motivated to either develop a skill, termed mastery orientation, or demonstrate a skill, termed performance orientation. Students with a mastery orientation focus on learning and understanding while students with a performance orientation focus on creating an aura of competence (Dweck, 1986; Kaplan and Maehr, 2007). For students with a performance orientation, competence is demonstrated through comparison with others (externality) while for mastery-oriented students, the comparison is to an internal standard (internality) or an absolute level (Kaplan and Maehr, 2007; Nicholls, 1984). Thus, locus of control operates through teenagers' expectations of the returns to human capital investments.

Students who identify as internals obtain significantly high grade point averages (GPAs) (Fong, 2000; Gifford et al., 2006; Trusty and Lampe, 1997). In addition, internals show significantly low academic procrastination, low debilitating test anxiety, and have high academic achievements (Carden et al., 2004; Kesici et al., 2009; Park and Kim, 1998). Hence, internality is a moderator of academic work readiness and a positive attitude towards academics. Contrarily, externality is characterized by procrastination, test anxiety, helplessness, depression, and hence low academic achievement (Anderson et al., 2005; Kelly, 2002; Nunn and

Nunn, 1993; Twenge et al., 2004), which all point towards low work readiness.

An internal locus of control is necessary for enhancing responsibility in the student, while an external locus of control accounts for students' excuses for failure (Weiner, 1986). Internality encourages effective achievement behavior in students. Weisz (1984) proposed that effective achievement behavior requires selectivity, that is, the capability to distinguish between outcomes that are contingent upon human influence and those that are not. Erroneous judgments about the contingency of outcomes often cause fruitless achievement attempts. Students who fail to recognize the non-contingency that prevails in a currently involved task in academic pursuit (e.g. environmental forces and religious commitment) tend to persist unreasonably in their effort to achieve and thus may be susceptible to frustration and disappointment. On the other hand, students who mistakenly believe that outcomes are highly non-contingent, when they are not necessarily so (e.g. belief in the immutability of intelligence), may not persist to a reasonable degree before terminating their pursuit. Either way, an internal or external locus of control may result in a high or low work readiness.

However, high work readiness is much linked to internal locus of control since internality prompts a mastery orientation to learning (Finney et al., 2004; Harackiewicz et al., 2000). A mastery orientation enhances deeper, more elaborate study strategies; selection of tasks that are challenging; persistence; and positive attitudes towards learning (Finney et al., 2004; Harackiewicz et al., 2000; Spector, 1982). On the other hand, externality promotes performance orientation which is associated with superficial or strategic learning strategies, selection of less challenging tasks, and withdrawal of effort when difficulty is encountered, hence showing a negative attitude towards academics (Finney et al., 2004; Harackiewicz et al., 2000).

The mastery orientation of internals encourages them to seek help more than externally oriented students (Karabenick, 2004). This help seeking attitude promotes cooperation with fellow students, lecturers, and the students involved will freely associate in clubs that enable positive coping with student stressors (Karabenick, 2004; Meece et al., 2006). On the other hand, the performance orientation of externals drives them to sheer antisocial tendencies such as the use of manipulation, deception, or ingratiation tactics to reflect an attempt to assert some influence over a hostile or stressful environment (Mudrack, 1989). In situations where externals are unable to obtain the reinforcements needed for survival, they view manipulation of others as a necessary defense (Solar and Bruehl, 1971). Whereas such misbehavior is not expected at the university, it is mainly a manifestation of recurrence from lower institutions of education where the students used to be highly supervised and controlled (Gable and Dangello, 1994). In this case externality results in low work readiness.

Internals are more likely to be committed than externals to the institution they are in (Furnham et al., 1994; Kinicki

and Vecchio, 1994; Luthans et al., 1987). The reasons for this commitment include perceived control over the work environment, perceived availability of alternatives, and having more likelihood to take action when dissatisfied with a situation. This implies that internals will be more motivated (Driscoll, 2005), have less fear, and show more interest and enjoyment than externals (Hadsell, 2009). Therefore, internals exhibit high work readiness.

Locus of control influences the affective and behavioral responses of students to educational service encounter (Bateson and Hui, 1987). These responses include information search (Lumpkin and Caballero, 1985; Wallston, 2005; Wallston and Wallston, 1978), customizing or personalizing the service process, and active participation in the service encounter (self-efficacy). Internally oriented individuals engage in more active information search than are externals (Lefcourt and Wine, 1969). Internals also use acquired information largely in decision making than externals (Phares, 1968). These general tendencies; combined with Mobley's (1977) observation that the intention to search for, the actual search for, and the evaluation of alternatives, are central components of the turnover process; suggest that university students who are internals will strive to achieve high academic grades.

Individuals showing an internal locus of control demonstrate higher levels of career maturity and lower levels of indecision (Brown et al., 2000; Carver et al., 1989; Hartman et al., 1985). Meanwhile external locus of control is related to career decision-making difficulties and lower degree of career decision-making self-efficacy (Fogarty and McGregor-Bayne, 2008; Lease, 2004; Luzzo, 1997). Hence, internal students have a higher work readiness than external students, and consequently internals have high work readiness as opposed to externals.

In the health care context locus of control theory suggests that internals will assume a greater responsibility for their own health outcomes and will prefer a more active role in the service encounter (Madhu and Sridhar, 2001; Steele et al., 1987; Zawawi and Hamaideh, 2009). Strickland (1978) states that internals are more likely to engage in proactive health promotion behaviors (e.g. self-efficacy role behaviors) and to seek more health related information than externals. The educational implication is that internals will strive to maintain healthy lifestyles and avoid unhealthy behavior that might interfere with their academic efforts. In contrast, externals require constant reminders and warnings to take up their routine health practices (Madhu and Sridhar, 2001; Murray, Wilcox and Kobayashi, 1996). Steele et al. (1987) note that these findings suggest that service (health care and education) providers need to customize their approaches to the service encounter to better meet the individuals' needs and expectations.

Most lifetime mental health disorders have first onset during or shortly before the typical college/university age (Kessler et al., 2005). These disorders may be precipitated or exacerbated by the variety of stressors in college life. The stressors include separation from family, sharing close

living quarters with strangers, the formation of new social groups, intense academic pressures and the balancing of social engagements with academic and other life responsibilities (Marano, 2002; Nakalema and Ssenyonga, 2014). While all of these circumstances offer opportunities for growth, they may also result in stress that precipitates the onset or recurrence of psychiatric or mental health disorders (Blanco et al., 2008).

Although most of the young people manage to handle college life stresses and challenges with aplomb, others have difficulty adjusting. They experience emotional turmoil, suffer from depressed mood, believe outside forces rather than their own efforts control their lives, and feel discontented with life. In response, some seek out artificial and unhealthy means of improving their mood or numbing their unpleasant thoughts and feelings (Burger, 1984). Increases in external locus of control among the students relates to the concurrent trends toward increased depression and anxiety, drug abuse, and diminished academic effort and achievement (Twenge et al., 2004).

Internals are more likely to commit to innovative tasks (Hollenbeck et al., 1989; Howell and Avolio, 1993) and believe in their own abilities to perform behaviors that are necessary to control events and consequently set their own goals (Phillips and Gully, 1997). As a result, internals put a great deal of effort into mastering situations (Brenders, 1987; Ryff, 1989; Zimmerman and Rappaport, 1988) and derive more satisfaction from situations calling for personal control (Brenders, 1987).

In contrast, externals avoid those situations that require their active involvement (Brenders, 1987). It also appears that the external belief (powerful others or chance) undermines people's beliefs in their own self-efficacy and their environmental mastery (Zimmerman and Rappaport, 1988). However, the two types of externals think and behave differently. Externals who believe in powerful others prefer that powerful others make decisions for them and regulate the environment (Levenson, 1981). On the other hand, externals who believe in chance or fate may lack the desire for control because they believe that events are uncontrollable and unpredictable. They may become disengaged, helpless and hopeless about any form of order occurring since they appear to question the legitimacy of powerful others (Martin and Hall, 1992). Therefore, externals are more likely than internals to have a negative attitude towards academics.

In the application of the stressor-emotion model (Lazarus, 1982) to counter productive work, the sense of control - over one's own behaviors, over events in one's social or physical environment, or a combination thereof is key to the appraised coping capacity. A negative appraisal in which conditions are appraised as harmful, threatening, or challenging mainly results from externality rather than internality. Negative appraisal triggers negative emotions. These emotions, in turn, link to strain responses such as anger, envy, jealousy, anxiety, fright, guilt, shame, and sadness, also called stress emotions (Lazarus, 1999). On the other hand, individuals with an internal locus of control are

predisposed to view situations as controllable, and are less likely to appraise situations in a threatening way (Spector and Fox, 2005).

In a similar way, individuals high in self-efficacy concerning a domain are unlikely to appraise domain-specific challenges, such as a new work assignment, as stressors. Internals mainly exhibit constructive problem-solving emotions such as withdrawal from the source of trouble. In addition, internals sublimate their efforts in compensatory activities such as concentrating on academic work, which most likely leads to improved academic achievement, thence a positive academic attitude.

Internals are less alienated from the work environment and less likely to commit counterproductive behaviors in response to work frustration (Fox and Spector, 1999). Heacox (1996) found external locus of control to be related to aggression against others. Similarly, students with an external locus of control are more likely to be misbehaved, be the causes of negative student activism and obstructionism (Baron and Neuman, 1998), and be terminated for abusing members of the institution (Perlow and Latham, 1993). Storms and Spector (1987) found locus of control to moderate the relation between frustration and counterproductive work behavior. For externals but not internals, there was a significant relationship between frustration at work and counterproductive work behavior.

Individuals possessing an external locus of control tend to be anxious, aggressive, dogmatic, less trusting of others, and have lower self-esteem than individuals operating under a more internal sense of control (Igbaria and Parasuraman, 1989; Joe, 1971; Levenson and Mahler, 1975; Storms and Spector, 1987). According to Seligman (1975), an external learns to be helpless with respect to a given outcome when that outcome is perceived to happen independently of the individual's voluntary responses.

Not surprisingly, students who perceive a low likelihood of academic success are likely to engage in negative word of mouth and hence strain their social relations (Blodgett et al., 1993; Richins, 1983). In addition, they are likely to indulge in alcohol, cigarette, and drug consumption (Lefcourt, 1991) as ways of coping. As opposed to this, internals are more self-confident and in charge, tend to take dramatic social action and attempt to alter situations, which they perceive as aversive, or uncomfortable (Cox and Cooper, 1989; Strickland, 1977). The academic schedule of internals is on their priority list and they cannot easily substitute it with time-wasting activities, while at the same time recognizing the importance of social and group support.

Students' locus of control predicts their future employability and job satisfaction. Internal university graduates expect to have higher incomes than do external university graduates (Brady, 2010). However, internal university dropouts expect to have lower incomes than do external dropouts. Such an expectation makes internals to invest seriously in education by working hard. Consequently, a student with an internal locus of control will adopt a positive attitude towards hard work for a better academic achievement (Schaap et al., 2003). Meanwhile a

student with an external locus of control will attribute his or her academic struggles to other people and fate, and hence adopt a negative attitude (Schaap et al., 2003).

However, Rotter (1975) cautions against the tendency to assume that an internal locus of control is good and an external locus of control are bad. It should be noted that reality sometimes limits the amount of personal control an individual can possess. Further, it should be recognized that in some situations the best coping method might be to move toward the perception of a more externally focused locus of control. Rotter (1966) refers to individuals who move toward a more external view of failure-producing situations as defensive externals. Coupled with this, students with external locus of control are more obedient, easy to persuade, and accept information more easily (Calhoun and Acocella, 1990; Fong and Aldalalah, 2010). Internality and externality are thus precursors of academic attitudes among learners.

Nicolaidou and Philippou (2003) posit that among student variables, attitudes are an important/key factor to be taken into account when attempting to understand and explain variability in student performance. For instance, passive procrastination is associated with more negative academic attitudes, while students who prefer working under pressure have a more positive academic self-perception. Again, distance learning students have a more positive attitude towards teachers and faculty (Round, 2005). Other factors presented by Round that play a vital role in influencing student attitudes include factors associated with the students themselves (e.g., anxiety, self-efficacy and self-concept, motivation, and experiences at school); factors associated with the school, teacher, and teaching (e.g., teaching materials, classroom management, teacher knowledge, attitudes towards the subject, guidance, beliefs); and finally factors from the home environment and society (e.g., educational background, parental expectations).

According to Nicolaidou and Philippou (2003), negative attitudes are the result of frequent and repeated failures or problems when dealing with learning tasks and these negative attitudes may become relatively permanent. According to Nicolaidou and Philippou, learners at first possess positive attitudes, but as they advance in academic ladders their attitudes become less positive and frequently become negative at high school. Some other factors associated with declining attitudes as learners move up the academic ladder include the pressure to perform well, over demanding tasks, uninteresting lessons and less than positive attitudes on the part of teachers (Zan and Di Martino, 2008).

The subject of study also tends to pose differentiation in attitudes by gender. For instance, mathematics is often considered to be a male-dominion (Lindberg et al., 2010). Contrary to this, it is commonly believed that girls have more positive attitudes towards languages than boys. However, findings by Lindberg et al. show that math school achievement and grades do not differ significantly between boys and girls. A number of Meta-analyses allude to this fact. What varies is therefore not the performance or score but

rather the disposition basing on the gender of the student. Several studies undertaken to determine the relationship between students' academic attitudes and academic achievement indicate only weak correlations between these variables, and these relationships depend on several variables including grade, sample size, ethnic background (Mata et al., 2012). However, studies (e.g., Nicolaidou and Philippou, 2003) point to a positive correlation between student attitudes towards mathematics and student academic achievement.

The learning environment also affects the academic attitudes. A study by Akey (2006) shows that several school factors including teacher support, student-to-student interaction, and the academic and behavior expectations of the teacher significantly relate to student attitudes and behaviors. Similarly, Binti Maat and Zakaria (2010) posit a significant relationship between learning environment and attitude towards mathematics, stating that the way students perceive teacher characteristics will affect their attitudes towards mathematics. A teacher perceived to be supportive enhances students' academic attitudes towards the subject he or she teaches (Rawnsley and Fisher, 1998). Singh et al. (2002) posit motivation as yet another factor that affects learners' academic attitudes in addition to the other factors.

Alias et al. (2012) indicate that students tend to have internal locus of control rather than external locus of control; and that the internal students have above average level in self-efficacy and positive attitudes, with female students having stronger positive attitude compared to male students. Prociuk and Breen (1974) similarly posit that internal locus of control is related positively to effective study habits and attitudes and to college academic success, while the opposite is true for powerful others and chance control dimensions of external locus of control.

In conclusion, academic as well as social success requires a good blend of academic attitudes and locus of control. These together enhance a high work readiness (Cramer, 1995; Skoe and Marcia, 1991; Waterman, 1982; Waterman et al., 1974), which reflects in high achievement or work performance. The blend is particularly important in the transition from secondary school to university since the student should drive his or her own behavior, emotions, and thoughts maturely. Unfortunately, the trend in academic performance of students pursuing a career in secondary school science teaching at the selected public university suggested a deficiency in the students' locus of control and academic attitudes. Hence there was need to investigate the levels of locus of control and academic attitudes, and determine the prediction effect of the former variable on the latter among the students. This would enable logical explanations of the extant performance deficiencies and advance matriculation and progress criteria for the students.

Objectives

The objectives of the study included the following:

1. To describe the levels of academic attitudes and locus of

control of secondary school science education teacher trainees in Uganda.

2. To determine the correlation between the academic attitudes and locus of control of the science education teacher trainees.

3. To determine the prediction effect of locus of control on academic attitudes among the students.

Research question and hypothesis

The study sought to answer the research question: What are the levels of academic attitudes and locus of control of secondary school science education teacher trainees in Uganda? It was further guided by the following hypotheses:

H1. There is a negative correlation between academic attitudes and locus of control of secondary school science teacher trainees in a public university in Uganda.

H2. Locus of control significantly predicts academic attitudes among secondary school science teacher trainees in Uganda.

METHODOLOGY

The study employed quantitative methods, using cross-sectional survey research design in which descriptive and correlational data interpretation was used. The study population comprised Bachelor of Science with Education students at a public university in Uganda. A census sample of 203 participants was obtained out of a target of 216 students, yielding 93.98% response rate. Taking a census ensured fair representation of the various categories of students (Sarantakos, 1998; Sarantakos, 2005).

A structured questionnaire with closed ended items was used to collect data on the biodata, academic attitudes, and locus of control of the respondents. The biodata included age range, gender, year of study, subject combination, and residence. McKenna and Kear's (1990) 20 item attitude survey (construct validity .70 and Cronbach-alpha reliability .82) was adapted to measure the respondents' academic attitudes. The survey measured recreational and serious academic attitudes. The 26 item Rotter's (1966) generalised locus of control scale (construct validity .80 and Cronbach-alpha reliability .88) as cited in Schaap et al. (2003) was used to measure the participants' locus of control.

Permission and introduction to conduct the study was granted by the Mbarara University of Science and Technology Research Ethics Committee (MUREC). Three lecturers handling the students in question were contacted for permission to engage their respective first year, second year and third year students in the study. This was aimed at administering the questionnaire to all the students during a non-optional lecture where all the students in the same year would be present. This helped ensure uniform conditions of administration for all the respondents, and enabled the researchers to make verbal communication and clarification of some issues. After self-introduction of the researchers

dates were set for data collection.

During data collection, the respondents were addressed, reasons and details of the study were explained, and respondents were requested for consent. All the respondents consented, but it was their right to decline to give data any time they felt uncomfortable with the process. The instrument was then administered to the consented respondents. Clarification of instructions and other emerging issues were attended to. The respondents filled the instrument within 30 minutes. The researcher cross-checked the filled instruments for items that might be unintentionally skipped to return completely filled instruments. The questionnaires were then collected the same day. Ethical issues of consent, confidentiality, anonymity, and benefits were particularly addressed.

The data from the questionnaires were entered in the Statistical Package for Social Scientists (SPSS). The first 10 items of the Academic Attitude Scale measured recreational academic attitudes. Examples of items in this category include the following: a) "How do you feel about doing academic work during your vacation?" and b) "How do you feel about doing academic work instead of playing?" While the next 10 measured serious academic attitudes. Examples of the items include a) "How do you feel about teaching yourself a new topic/concept?" and b) "How do you feel about writing lecture notes?" The items were reverse scored on a four point Likert scale ranging from 1 (*very upset*) to 4 (*happiest*). The sum of scores were put in ranges and interpreted as very negative (20-30), moderately negative (31-40), indifferent (41-59), moderately positive (60-69), and very positive (70-80).

Thirteen pairs of items were used to measure locus of control. Items measuring internality were scored zero each, while those measuring externality scored one each. Examples of items to measure internality are a) "The idea that teachers or lecturers are unfair to students is nonsense" and b) "In the case of the well prepared student, there is rarely, if ever, such a thing as an unfair test." The corresponding items of the pairs for measuring externality are a) "Most students don't realize the extent to which their grades are influenced by accidental happenings such as (intentional) errors by teachers/lecturers" and b) "Many times exam questions tend to be so unrelated to course work that studying is really useless." The score sum for every participant was obtained and a score of zero to six indicated internality while a score of seven to 13 indicated externality.

RESULTS

Levels of Locus of Control and Academic Attitudes among Secondary School Science Teacher Trainees

The sample demographic characteristics, mean scores in locus of control and academic attitudes, and tests of difference are presented in [Table 1](#). The results indicate that

Table 1. Sample Demographics, Academic Attitudes, and Locus of Control

Demographic	Categories	N	Percent	Locus of Control		Academic Attitudes		
				Mean	SD	Mean	SD	<i>p</i>
Gender	Male	174	85.70	7.62	2.13	37.73	7.85	<i>ns</i>
	Female	29	14.30	7.51	2.32	39.00	9.70	
Age	18-22	134	66.00	7.56	2.15	38.32	8.12	<i>ns</i>
	23-27	69	34.00	7.70	2.24	37.11	8.15	
Home area	Rural	115	56.70	7.67	2.18	36.72	8.54	.007*
	Urban	88	43.30	7.52	2.18	39.47	7.31	
Year of study	First	75	36.90	7.59	2.09	36.71	7.70	<i>ns</i>
	Second	57	28.10	7.70	2.47	39.42	8.64	
	Third	71	35.00	7.55	2.03	37.97	8.05	
Specialty	Biology	58	28.60	7.21	1.59	39.33	9.40	<i>ns</i>
	Chemistry	49	24.10	7.39	1.92	35.86	7.49	
	Mathematics	47	23.20	8.13	1.83	39.15	7.62	
	Physics	49	24.10	7.80	2.12	37.10	7.24	
Residence	Resident	68	33.50	7.72	2.24	38.22	8.84	<i>ns</i>
	Non-resident	135	66.50	7.55	2.15	37.76	7.78	
Religious affiliation	Muslim	11	5.42	8.00	2.10	38.36	5.57	<i>ns</i>
	Pentecostal	42	20.68	7.36	2.22	37.86	8.05	
	Protestant	68	33.50	8.01	2.08	37.54	8.97	
	Catholics	75	36.95	7.44	2.23	38.32	7.58	
	Other	7	3.45	6.29	1.98	36.71	10.81	

Note. * = *p*-value for Mann-Whitney U test.

majority of the students were males (85.70%), in the 18-22 age range (66.00%), with original homes in the rural areas (56.70%), and non-resident at campus (66.50%). Distribution per year of study was 36.90% first year, 28.10% second year, and 35.00% third year. Trainees specialising in Biology constituted 28.60% of the population, Chemistry 24.10%, Mathematics 23.20%, and Physics 24.10%.

To establish the levels of locus of control and academic attitudes among the trainees, means of scores were generated. The resultant descriptive statistics are presented in Table 2. Results in Table 2 reveal that the trainees mainly used external locus of control ($M = 7.61$, $SD = 2.18$) and generally had moderately negative academic attitudes ($M = 37.91$, $SD = 8.13$). Students specialising in Mathematics ($M = 8.13$, $SD = 1.83$) had the highest mean external locus of control compared to students specialising in the three other subjects (Table 1). A Mann-Whitney U test to compare the levels of academic attitudes showed that there was a statistically significant difference ($U = 3947.50$, $p = .007$) between students from rural areas (mean rank = 92.33) and those from urban areas (mean rank = 114.64); students from rural areas had more negative or less positive academic attitudes than their counterparts from urban areas (Table 1).

Correlation between Locus of Control and Academic Attitudes among Secondary School Science Teacher Trainees

Results Pearson Product Moment Correlation analysis

indicate that a low statistically significant negative correlation ($r = -.30$, $p = .05$) existed between academic attitudes and locus of control. This means that a student having an internal locus of control would most likely have a positive academic attitude and vice versa. Hence the hypothesis that there is a statistically significant negative correlation between locus of control and academic attitudes is accepted. Additional analysis indicated a low statistically significant correlation ($r = -.22$, $p = .05$) between locus of control and serious academics subscale of academic attitudes. This means that an internal student will have a positive attitude towards serious academic work.

Prediction of Academic Attitudes from Locus of Control among Secondary School Science Teacher Trainees

A simple linear regression equation was modeled to predict academic attitudes from locus of control. The results in Tables 3, 4, and 5 show that the equation gave a statistically significant prediction coefficient. Analysis of variance gave a significant difference, $F(1, 202) = 6.733$, $p = .01$, between the influence of locus of control and other predictor variables (not included in the model) in predicting the trainees' academic attitudes. The multiple correlation for the equation, $R = .18$, $R\text{ Square} = .032$, was moderately low. Eyeball interpretation of the R square value reveals that locus of control predicts only up to 3.2% of the students' academic attitudes. From Table 5, every unit increase in the level of locus of control in moving from internality towards externality causes a .18 reduction in academic attitudes ($t = -2.595$, $p = .010$). In this case, increase in locus of control

Table 2. Descriptive Statistics of the Sample

	Min	Max	Mean	SD	Level
Academic attitudes	20	64	37.91	8.31	Moderately negative
Locus of control	0	12	7.61	2.18	External

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.180 ^a	.032	.028	9.11729

a. Predictors: (Constant), locus of control

Table 4. Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	559.718	1	559.718	6.733	.010 ^b
	Residual	16708.134	201	83.125		
	Total	17267.852	202			

a. Dependent Variable: Academic Attitudes

b. Predictors: (Constant), Locus of Control

Table 5. Model Coefficients (with Academic Attitudes as Dependent Variable)

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	46.385	2.332		19.893	.000
	Locus of control	-.765	.295	-.180	-2.595	.010

from internal to external reduces academic attitudes, while moving from external to internal would conversely increase academic attitudes.

Discussion

This study found out that majority of the trainees had an external locus of control, implying that they would attribute outcomes of situations or events in their lives to outside causes. According to Spector (1982), such a tendency could be good news for school administrators as persons with external locus of control are suitable for the position of "teacher" where rules and commands are strictly observed and deadlines precisely met. However, it implies that once these trainees graduate they may prove unsuitable for appointment to decision-making positions requiring independence such as head of department, director of studies, deputy head teacher, or head teacher given their excessive reliance on external others to push them to act. In the same vein, the external teachers would not have as much job satisfaction as internal teachers would, and hence the externals would register many complaints. This means that in-service training may not salvage a situation of negative science orientation in schools as effectively as expected, further meaning that the training objectives

would not be implemented. In addition, such teachers will add nothing new to the bare minimum skills they have been equipped with. Therefore, trainees need be focussed to be internally controlled (Serin et al., 2009).

The trainees' also had generally negative academic attitude, which is in agreement with what Batchelor (1975) posited more than three decades ago, that students generally show a negative attitude towards academics. In the same vein, Hardingan (2004) argues that university students come to get a degree, not an education, and how the students get their degrees is often not as important as the degree itself. McCade (2004) also found out that many students just want the degree itself and want to do as little as possible to get it. This implies that there is an uphill task for the government: Trainees need to be educated before and during pre-service training to appreciate teaching as a noble profession. Otherwise, more challenges could accrue once the graduates with negative academic attitudes are let in the field and pumped with in-service trainings that the trainees might turn into occasions of escalating their grievances.

Conclusion

The BSc (Ed) students mainly used external locus of control

and had negative academic attitudes. The study contrasts sharply with previous research regarding these variables. The use of external locus of control by university students shifts responsibility of academic concerns from the students to other external causes with a consequent evolution of negative academic attitude which is counterproductive. This surely leads to poor grades since the students may not take their studies seriously.

Recommendations

There is need to design interventions focusing on the negative academic attitudes and external locus of control among students. These interventions should help the students from diverse backgrounds, with complex personal experiences, to improve academic performance as well as future employability.

The government should embark on selecting teachers with the right disposition at entry to pre-service training so as to foster the needed changes in science and technology education for national socioeconomic transformation. In addition, the formative stages of education at primary and secondary school levels should be facilitated with imparting of metacognitive skills including internal locus of control among the learners. The emphasis on “passing” with minimum input into attitude, value, and skills education should be reversed so as to match the expectations made of the students at higher institutions of learning.

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