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Determinants of Persistence Among Science Teacher-Trainees: Examining the Role of Self-Efficacy, Task Value, and Academic Hope

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ABSTRACT

Grounded in the expectancy-value and hope theories, the present study was conducted to examine the extent to which self-efficacy, task value, and academic hope predict persistence among science teacher-trainees in Uganda. The sample consisted of 278 undergraduate science teacher-trainees selected from a large public university in northern Uganda. Data were collected using several scales from the modified Motivated Strategies for Learning Questionnaire, Academic Hope Scale, and College Persistence Questionnaire and analyzed using structural equation modeling. Task value and academic hope significantly predicted students' persistence. Academic hope made a greater contribution to students' persistence compared to task value. The combined effect of task value and academic hope did not make any significant contribution to students' persistence. The study highlights the need to strengthen students' hopeful thinking and task value in order to increase their chances of completing their studies. Implications of the study findings for educational practice and for the training of science teacher-trainees are elaborated in the article.

KEYWORDS

Academic hope; persistence; science teacher-trainees; self-efficacy; task value

The need to understand the factors that underpin students' persistence and retention in higher institutions of learning has recently increased research interests along this line of inquiry. It is through higher education that a country prepares human resource personnel who are able to take on key positions in major social service sectors such as health, education, and transport, among others. Hence, much attention should be focused on the well-being and retention of students at this level of learning. Student attrition from universities not only adds to the semiskilled labor burden in the country but also negatively impacts on the incomes of educational institutions, as their financial earnings are tied to graduation rates and numbers of enrolled students (Beck & Davidson, 2010).

In Uganda, over the past 30 years, there has been an increase in the number of universities from one to 46 (including 31 private universities, 11 public universities, and four military universities), thereby increasing the access of students to higher education.

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Consequently, the number of teacher-training institutions has also increased during this period. However, as Nakajima, Dembo, and Mossler (2012) asserted, access to university education is in itself insufficient. Students should also be able to graduate within their programs' stipulated durations of study in order to get the full benefits of a university education. A World Bank (2006) report indicated that the attrition rate of students in Ugandan universities is 60%, although actual figures as of 2017 are not known. Several studies have tied students' persistence to their motivation (Garza, Bain, & Kupczynski, 2014; Neuville et al., 2007; Pintrich & Schunk, 1996; Wigfield & Eccles, 2000), and this is even well supported by the expectancy-value (EV) theory of achievement motivation (Wigfield & Eccles, 2000) and hope theory (Snyder et al., 2002).

Although the country struggles with the highest teacher-to-student ratio (65:1) in its secondary schools (Ministry of Education and Sports, Uganda, 2011), not much research has been focused on factors that lead to the persistence of teacher-trainees to complete their studies and hence fill this shortage of teachers in the country. Dropout of science teacher-trainees would imply a low supply of teachers, whose numbers are already threatened by high turnover intentions (Muhangi, 2015). Therefore, in the present study, we tried to bridge this gap by using structural equation modeling (SEM) to examine the factors that predict the persistence of science teacher-trainees in Uganda to complete their university education. Specifically, we examined the extent to which motivational factors (i.e., self-efficacy, task value, and academic hope) predict the persistence of science teacher-trainees. The study findings not only inform university administrators and researchers who are developing interventions to integrate undergraduate students well into the academic and social fabrics of their institutions but also add literature to the less studied field of the retention of teacher-trainees in developing countries, especially in Uganda.

In the following sections, we first give an overview of the theoretical framework, followed by the literature related to the study variables, before describing the present study.

Background and theoretical framework

Before doing any activity, people are always confronted with particular questions regarding their competences in doing such tasks and the usefulness of such tasks. This form of inner debate in an individual involves questions such as "Do I possess enough skills to accomplish this task?" "How does this activity fit within my overall career goals?" and "How much energy do I need to successfully complete this task?" among others. Individuals who answer such questions in the affirmative will exhibit increased motivation and persistence in doing a given activity compared to those who are highly doubtful of their competences and the usefulness of the task. In educational settings, learners also engage in such inner debates before performing any academic task.

Since the 1930s, researchers (especially motivational theorists) have struggled to explain the factors influencing human motivation and persistence in tasks. Borrowing from several works (e.g., Lewin, 1938; Tolman, 1932), Atkinson (1957) proposed EV theory, which has had far-reaching and direct implications for educational practice. In his theory, Atkinson (1957, 1964) posited that an individual's motivation and persistence in a given task depends heavily on his or her expectancies and value for success. This conceptualization was later expanded into other modern EV theories explaining achievement behaviors (Eccles & Wigfield, 1995; Meece, Wigfield, & Eccles, 1990; Wigfield & Eccles, 1992;

Wigfield, Eccles, & Pintrich, 1996) that have been empirically tested in several academic settings and contexts (Eccles, Wigfield, & Schiefele, 1998; Neuville et al., 2007; O'Neill & Thomson, 2013). Compared to Atkinson's initial EV theory, modern EV theories (a) give very detailed explanations of the value and expectance components; (b) connect expectance and value components to a number of psychological and cultural determinants; and (c) assume that expectancies and values are positively related to each other rather than being inversely related, as originally proposed by Atkinson (Eccles & Wigfield, 2002).

An individual's beliefs about how well he or she will perform in an upcoming task (either in the immediate or long-term future) is defined as his or her expectance for success (Eccles & Wigfield, 2002). In this regard, a student may ask himself or herself questions such as "How well will I perform in this course this semester?" and "How well will I perform in this course compared to other students in my class?" among others. In addition, a learner evaluates his or her competences in a given subject domain. During this self-evaluation of ability beliefs, the learner may ask himself or herself questions such as "Am I good at this subject?" and "How do I rank my abilities in this subject compared to the rest of my classmates?" among others. Students who answer these questions in a more positive way will probably have high motivation, exhibit persistent behaviors in pursuit of their goals, and expend a lot of effort in achieving their goals (Wigfield & Eccles, 2000).

Although ability beliefs and expectance for success are highly correlated (Eccles & Wigfield, 1995), these two constructs are conceptually different, in the sense that ability beliefs are centered on present ability whereas expectancies focus on the future (Wigfield & Eccles, 2000). In fact, Bandura (1997) distinguished between two forms of expectance beliefs: (a) outcome expectations and (b) personal expectations. Outcome expectations are the expected benefits and costs of performing a behavior, whereas personal expectations involve a person's belief that he or she can produce a given outcome (commonly referred to as *self-efficacy* in sociocognitive theory). The EV construct of expectance for success is similar to Bandura's personal expectations construct (called *self-efficacy*), and in the present study we conceptualized the EV variable of expectance as being similar to self-efficacy.

Self-efficacy refers to a person's belief that he or she possesses the required competences and skills to accomplish a given task. Previous studies have demonstrated that self-efficacy is highly correlated with academic achievement and persistence (Bandura, 1997; Hagedorn, Maxwell, & Hampton, 2002; Multon, Brown, & Lent, 1991; Nakajima et al., 2012; Silver, Smith, & Greene, 2004), and hence self-efficacy is highly predictive of students' persistence behaviors (Bean & Eaton, 2001–2002; Lent, Brown, & Larkin, 1984; Pajares, 2002; Pajares & Miller, 1994, 1997).

In academic settings, *task value* may be defined as a learner's perception of the significance of a given academic task. The value construct is related to questions such as "Why should I do this task?" (Pintrich & DeGroot, 1990; Wigfield, 1994) and "Of what relevance is this task to my future goals?" among others. Value can further be categorized into four different components: intrinsic value, utility value, cost, and attainment (Wigfield & Eccles, 1992, 2000). Although a discussion of these categories is beyond the scope of the present study, interested readers may refer to Wigfield and Eccles (2000) for a detailed description of these value categories. Task value is highly correlated with persistence behaviors, and hence it can be used to predict students'

persistence behaviors (Bong, 2001; Karpanty, 1998; Neuville et al., 2007; Torres & Solberg, 2001; Wigfield & Eccles, 2000).

Originally proposed in hope theory (Snyder et al., 2002), *hope* is defined as “the process of thinking about one’s goals, along with the motivation to move towards these goals (agency), and the ways to achieve those goals (pathways)” (Snyder, 1995, p. 355). Hope has been linked to high academic achievement and persistence behaviors among students (Snyder et al., 2002). Hope is a dynamic cognitive motivational system rather than an emotion (Snyder et al., 1991), and in the pursuit of one’s goals emotions follow cognitions (Snyder et al., 2002). Highly hopeful students have high motivation to attain their goals (i.e., high agency) and lay down a number of strategies to attain these goals (i.e., pathways thinking). In fact, there is convincing evidence that agentic and pathways thinking complement each other (Snyder et al., 1991), and thus students should not only be helped to set up realistic achievement goals but also be guided on adopting appropriate strategies on how to attain these goals. In the face of obstacles, high pathways thinkers can devise much better alternative solutions in order to overcome such obstacles. It is this ability to diversify one’s pathways that makes hopeful students highly persistent compared to low-hope students.

Generally speaking, from EV and hope theories, it is evident that self-efficacy, task value, and academic hope are highly predictive of students’ persistence. However, it is important to note that studies examining the relationships between self-efficacy, task value, hope, and persistence have been confined to student populations other than teacher-trainees, leaving knowledge gaps in this perspective. Given the leading roles of teachers in national transformation, we believe that it is worth attending to these knowledge gaps. The present study is therefore helpful in addressing such gaps by examining the extent to which teacher-trainees’ self-efficacy, task value, and academic hope predict their related academic persistence. Results from the present study are important in designing interventions that could aid in the effective integration of teacher-trainees into the social and academic spheres of their institutions of learning and consequently reduce the chances of attrition among these students.

Previous studies examining the relationships between self-efficacy, task value, and students’ persistence

The positive relationships among self-efficacy, task value, and persistence are well documented in a number of empirical studies (Atkinson, 1964; Bandura, 1994; Choi, Fiszdon, & Medalia, 2010; Eccles, 1984, 1987; Eccles et al., 1983; Eccles & Wigfield, 2002; Mohsenpour, Hejazi, & Kiamanesh, 2008; Neuville et al., 2007; Pajares, 2002; Pajares & Graham, 1999; Pajares & Miller, 1994, 1997; Pintrich & Schunk, 1996; Schunk, 1991; Wigfield & Eccles, 2000). However, many of these studies were mainly conducted in developed countries, especially in the United States (e.g., Eccles & Wigfield, 2002; Pintrich & Schunk, 1996; Schunk, 1991; Wigfield & Eccles, 2000), Asia (e.g., Bong, 2001; Li, Guo, Yao, Wang, & Yan, 2016), and Europe (e.g., Neuville et al., 2007).

Nakajima et al. (2012) examined the role of psychosocial variables (including self-efficacy and goals) in the persistence of 427 community college students in a certain U.S. institution. Self-efficacy was measured using a 20-item college self-efficacy inventory, whereas retention was assessed by students’ enrollment in the next semester.

Correlation analyses indicated that self-efficacy was not related to retention, and subsequent analyses indicated that self-efficacy did not influence the retention of students. These findings contradicted earlier findings (e.g., Pajares, 2002, 2003; Wigfield & Eccles, 2000) that had indicated that self-efficacy strongly predicted students' persistence. However, because Nakajima and colleagues assessed self-efficacy at the beginning of the semester, when efficacy had probably not been well developed, it is not surprising that no relationships were found between students' efficacy and their related persistence. It is probable that the results could have been different had efficacy been assessed either in the middle or close to the end of the semester.

In Korea, Bong (2001) studied the predictive utility of task value and self-efficacy beliefs on the persistence of 168 female undergraduate students in one university. Self-efficacy was measured at different levels using five different subscales, whereas students' persistence was assessed by examining students' future enrollment intentions. Various components of self-efficacy were correlated with task value except for problem-specific self-efficacy. Also, self-efficacy beliefs after midterm negatively influenced students' persistence. Task value more strongly predicted students' persistence compared to self-efficacy. Given that previous studies have argued strongly in favor of self-efficacy predicting persistence (e.g., Pajares, 2002, 2003), this finding was indeed surprising, and Bong wrote, "This finding is puzzling in light of the self-efficacy theorists' claim that self-efficacy wields a critical influence on subsequent task choice" (p. 565).

However, Bong's results diverged from other findings. Şen (2016) examined the structural relationships between self-efficacy, learning strategies, and effort regulation in a sample of 227 high school students. *Effort regulation* referred to the ability of a student to resist distractions and continue learning in face of challenges; hence, it was indicative of a student's persistence behaviors (Pintrich & DeGroot, 1990). Şen indicated that self-efficacy predicted students' effort regulation ($\beta = .62$). However, in the same year Şen and Yilmaz (2016) later revealed that self-efficacy did not predict effort regulation among preservice teachers in Turkey.

Taken together, these inconsistent results indicate that the relationship between self-efficacy and students' persistence is rather a controversial issue and depends greatly on the study population and contexts under investigation.

Li et al. (2016) examined the role of task value in in-service learning engagement among 44 Chinese college students. Self-report questionnaires and weekly reflective journals were used to collect data. Engagement from a behavioral point of view relates to students' persistence in a given learning activity. Consistent with the findings of Johnson (2009), Li and colleagues indicated that students' subjective task value highly influenced their persistence. These results also provided further support for the application of EV theory to in-service learning.

Cox and Whaley (2004) examined the influence of success expectations and task value on the achievement behaviors of 189 high school basketball players. Achievement behaviors were assessed from players' persistence and efforts as rated by their coaches. Preliminary results indicated positive correlations between students' success expectations, task value, and achievement behaviors. In addition, male students had significantly greater efforts and persistence than female students. Regression analyses further demonstrated that both expectance for success and task value significantly predicted students' efforts and persistence among White and African American students. Further analyses showed that

self-beliefs and task beliefs mediated the relationships between students' identities and their achievement behaviors. The study indicated a significant role of students' identity (especially ethnicity) in determining their persistence. Results from this study confirmed the applicability of EV theory to sports psychology.

Michelle (2015) examined the relationships between different motivational factors and the persistence and achievement of community college students. Binary logistic regressions revealed significant influences of self-efficacy and task value on the persistence of the respondents. Further analysis showed that the influence of task value and other motivational factors was not moderated by any demographic variable.

These results generally indicate that the influence of self-efficacy on persistence is rather controversial and inconsistent, and this assertion is also supported by Schunk (1991). In addition, although in clinical settings an increase in self-efficacy may be associated with high persistence levels, this may not be the case in academic contexts, where skill learning is taking place. As their skills develop, learners may not need to persist so long to solve or respond to problems, and thus persistence may relate negatively, rather than positively, to students' efficacy (Schunk, 1991). Also, at the beginning of academic tasks, learners may prove to be persistent in their studies because they are under the close supervision of their teachers; hence, in this case, assessing persistence in individuals under such external influence may lead to misleading findings.

Previous studies examining the relationships between hope and students' persistence

Earlier studies examining hope theory have indicated that highly hopeful students are persistent in their studies (Snyder et al., 1991). Students with higher pathways thinking set alternative pathways for achieving their goals, such that in case one alternative fails, they can easily adopt much better strategies to overcome such barriers (Snyder et al., 2002). In this sense they are more resilient and do not easily give up in pursuit of their goals. In fact, when hopeful students encounter obstacles, they perceive this as an opportunity to venture forth and test their capabilities rather than perceiving such barriers as deterrents.

Studies have consistently indicated that hope predicts students' persistence positively in a number of academic contexts, as explained in the subsequent paragraphs. It is important to note that hope predicts not only persistence but also academic achievement (Curry, Snyder, Cook, Ruby, & Rehm, 1997; Day, Hanson, Maltby, Proctor, & Wood, 2010; Snyder et al., 2002). In fact, in a 3-year longitudinal study, Day et al. (2010) showed that above students' previous academic achievements, personality, and intelligence, hope uniquely predicted their final degree mark.

Madison (2009) studied the influence of dispositional hope on the persistence of 238 community college students enrolled in a developmental writing course in the United States. Preliminary results indicated significant positive correlations between hope, agency, pathways thinking, and self-efficacy. This implies that students who had high beliefs in their competences to complete their course exhibited high hope, exhibited high willpower to complete their course, and were aware of the strategies to use in completing their course. Hope independently and significantly explained 6.6% of the variance in students' persistence in the absence of self-efficacy. Moreover, the interaction of self-efficacy and

hope could not significantly differentiate between the pairs of groups defined by course persistence in this study. This study supported the notion that self-efficacy and students' hope share some focus in the attainment of learning goals and the need to improve agentic thinking among these learners rather than their pathways thinking. The study also revealed that hope loses its predictive power when coupled with self-efficacy.

Holder (2007) examined the extent to which hope and other motivational factors predicted persistence in an online learning environment among 259 students. Hope (as measured by the Adult Hope Scale) differed marginally between persisters ($N = 209$, $M = 53.82$, $SD = 5.83$) and nonpersisters ($N = 50$, $M = 54.76$, $SD = 5.15$). The same study indicated that hope could not significantly predict persistence, whereas self-efficacy did.

In their qualitative study to examine the noncognitive processes that influenced several education outcomes among first-year students, Hansen, Trujillo, Boland, and MacKinnon (2014) identified four themes related to academic hope that influenced students' success and persistence. Prominent among these themes was hopeful thinking, in which learners expressed resilience in the face of hardships, developed several pathways on encountering difficulties, expressed high expectations of success, and generally exhibited a can-do attitude. In fact, one at-risk student (Marcus) said, "I've always felt like I would be very, very successful because I always know if I put my mind to something I can do it" (p. 56). Marcus seemed to have high agency/willpower to succeed and, no wonder, such high expectations enabled him to perform better than expected. In addition, students had challenges with establishing friendships, balancing their job and school commitments, and commuting to their institutions of learning, and these challenges threatened their social and academic integration on campus. Nevertheless, students overcame such threats by generating alternative pathways. This was well demonstrated by Jeff, who was employed at three jobs as a way of raising his tuition fees. Jeff said,

I had to cut back a little bit on the work which means—you know—changing your budget a little bit; but I was able to make it work. It's all really about not only limiting it (work) but time management ... I had to drop a class this semester. I knew early enough in the semester that I wouldn't be able to complete all of my classes if I kept this up. I'm planning on taking it over the summer ... (p. 57)

Hansen et al. demonstrated the significance of instilling a sense of hopeful thinking among students and working with students to help them overcome threats to their social and academic integration that could lead to attrition.

At this point, we should point out that studies about hope are scarce, which therefore leaves a lot of gaps in our holistic understanding of this motivational construct. The present study is therefore significant in responding to such knowledge gaps.

The present study

The present study was conducted with the purpose of examining the relationships among self-efficacy, task value, and academic hope among science teacher-trainees in a selected Ugandan university. As discussed in the previous literature, the persistence of students is highly context specific, and hence factors that may affect retention at a given institution of learning may not entirely hold for another institution. In fact, a good retention model that has worked well, say, in the European context may be inappropriate within the African

context; thus, there is a need to understand different student and institutional characteristics before designing an appropriate retention model. Ultimately research provides the best entry point to this understanding, and hence the present study is an attempt to develop retention models that fit the Ugandan context. The present study is also timely, given the overwhelming need to reduce the attrition rate of undergraduate students in Ugandan universities (Atibuni, 2012; Nakalema & Ssenyonga, 2013). In addition, given the inadequate research and literature on the persistence of undergraduate students in Uganda, the present study is important in guiding researchers interested in higher education retention in Ugandan institutions of learning.

Specifically, this study was guided by the following research question: To what extent do self-efficacy, task value, and academic hope predict students' persistence in their studies?

Self-efficacy, task value, academic hope, and persistence were conceptualized as latent variables and their respective items and subscales as manifest variables. Furthermore, self-efficacy, task value, and academic hope were treated as exogenous variables, whereas persistence was considered an endogenous variable (see Figure 1).

We developed parcels from the indicator variables of the underlying latent variables. For academic hope, we used two parcels (one parcel consisting of items from the agency subscale and the other parcel comprising the pathways thinking subscale items). Persistence in this study was assessed using two indicators (i.e., social integration and academic integration). In his theory of student retention, Tinto (1975, 1987, 1993) highlighted two forms of integration (i.e., social and academic integration) that are vital in determining a student's decision to remain at or withdraw from his or her institution of learning.

Social integration refers to students' sense of belonging, sharing values and similarities with others in the university environment (Davidson, Beck, & Silver, 1999). Such tendencies like participating in school club activities, attending soccer games, and having lunch together increase a student's connectedness to others within the university. High social integration leads to high academic achievement and hence higher persistence than among less socially integrated students (Gore, 2010).

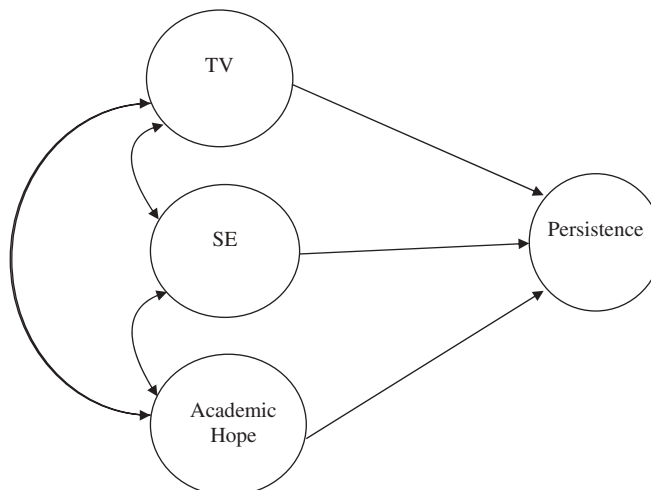


Figure 1. Hypothesized model showing the relationships among task value, self-efficacy, academic hope, and persistence. TV = task value; SE = self-efficacy.

Academic integration refers to how well the academic system of the institution appeals to the intellectual growth of the student, and this could be influenced by the quality of class instruction, session discussions, and classroom notes given to the students, among other things. A student achieves high academic integration if the university curriculum contributes significantly to his or her personal intellectual growth (Lindheimer, 2011).

The use of academic integration and social integration as indicators of persistence in the present study is well supported in the higher education retention literature (Bers & Smith, 1991; Braxton, Duster, & Pascarella, 1988; Cabrera, Nora, & Castaneda, 1993; Davidson, Beck, & Milligan, 2009; Gore, 2010; Mamiseishvili, 2012; Morris, 2002; Pascarella & Terenzini, 1980, 1983; Roberts, 2012; Terenzini, Lorang, & Pascarella, 1981; Terenzeni, Pascarella, Theophilides, & Lorang, 1985; Tinto, 1987, 1990, 1993).

For self-efficacy and task value, we developed item parcels using the odd-even method (Wang & Wang, 2012). Compared to individual items, the use of item parcels is advantageous as (a) unidimensional item parcels exhibit more multivariate normality than original individual items; (b) item parcels use fewer parameters in model estimation, thereby leading to parsimonious models (Kelloway, 2015; Wang & Wang, 2012); and (c) item parcels have less idiosyncratic variance compared to individual items. In situations in which latent variables are measured by many items, which would otherwise make model estimation more complicated, as there are many parameters to estimate in the analysis (Yang, Nay, & Hoyle, 2010), it is advisable to use item parcels. Indeed, because the four latent variables in the present study were represented by many individual items, use of item parceling in our case was appropriate and justifiable.

Method

Instrument

A self-report questionnaire comprising two sections was used to assess the study variables. The first section consisted of items about the students' demographic characteristics, such as gender, age, employment status, and sponsorship, among others. The second section consisted of four subscales that assessed students' motivational beliefs, academic hope, and persistence. The composition of these subscales is described here (see the Appendix for more details).

Students' self-efficacy and task value were assessed using self-efficacy and task value subscales adopted from the modified Motivated Strategies for Learning Questionnaire. We developed this modified Motivated Strategies for Learning Questionnaire from the original version (Pintrich, Smith, Garcia, & McKeachie, 1991) using confirmatory factor analysis (CFA). Items from both subscales were answered on a 7-point Likert scale with anchors ranging from 1 (*not true of me at all*) to 7 (*very true of me*).

Task value

We assessed the students' evaluation of how important their studies were using the 6-item task value subscale (Cronbach's $\alpha = .78$). Sample items included "It is important for me to learn the course material in this degree program," "I am very interested in the content area of my degree program," "I think the course material in this degree program is useful for me to learn," "I like the subject matter of this degree program," and so on.

Self-efficacy

Self-efficacy was assessed using the 6-item self-efficacy for learning and performance subscale (Cronbach's $\alpha = .78$). Examples of items in this subscale included "I believe I will receive an excellent grade in my class," "I'm certain I can understand the most difficult material presented in the readings for this program," and "I'm confident I can learn the basic concepts taught in this program."

Academic hope

Academic hope was assessed using the 8-item Academic Hope Scale, which we adapted from the original hope scale (Snyder et al., 2002) using CFA. We modified slightly the wording of the items in the original scale to reflect hope in academic situations. For example, the item "My past experiences have prepared me for my future" was modified and stated as "My past academic experiences have prepared me for my academic future." A CFA indicated an acceptable fit between the proposed model and the data: comparative fit index (CFI) = .981, Tucker–Lewis index (TLI) = .973, root mean square error of approximation (RMSEA) = .021, and standardized root-mean-square residual (SRMR) = .032. This Academic Hope Scale consisted of two subscales (i.e., the pathways and agency subscales). The pathways subscale (four items, Cronbach's $\alpha = .69$) assessed the students' plans to accomplish their academic goals. Examples of items on this subscale included "Even if the course is difficult, I know I can find a way to succeed" and "I can think of lots of ways to do well in classes that are important to me." The agency subscale (four items, Cronbach's $\alpha = .63$) assessed the students' will to achieve their academic goals. Examples of items on this subscale included "My past academic experiences have prepared me well for my academic future" and "I energetically pursue my academic goals." Items on both subscales were answered on an 8-point Likert scale with anchors ranging from 1 (*definitely false*) to 7 (*definitely true*).

Indicators of persistence

We assessed students' persistence using two subscales (i.e., the academic integration and social integration subscales) adopted from the College Persistence Questionnaire Version 2. Responses to the items depended on the wording of the item; for example, an item that asked "How concerned about your intellectual growth are the faculty staff here?" used a response scale ranging from *very concerned* to *very unconcerned*. Responses were then converted to favorability scores based on whether the response indicated something positive or negative about the student's university experience (+2 = *very favorable* to -2 = *very unfavorable*). The items were scored on a 5-point Likert scale with another option, not applicable, that applied to those students who thought that the item did not apply to them.

The academic integration subscale (seven items, Cronbach's $\alpha = .68$) assessed the students' perceptions of how the university supported their intellectual growth. Examples of items on this subscale included "In general, how satisfied are you with the quality of instruction you are receiving here?" and "How much of a connection do you see between what you are learning here and your future career possibilities?"

The social integration subscale (six items, Cronbach's $\alpha = .68$) assessed the students' sense of belonging and interactions with other students in the university. Sample items included "How much have your interactions with other students had an impact on your intellectual growth and interest in ideas?" "How strong is your sense of connectedness

with others (faculty, students, and staff) on this campus?” and “What is your overall impression of the other students at this university?”

Sample and procedure

Data were collected from 278 students in a bachelor's degree program in science education. In Uganda, a bachelor's degree in science education is pursued by students preparing to become teachers of science in secondary school. Selected students were enrolled at a certain public university in northern Uganda. This university was licensed to operate by the National Council for Higher Education, a regulatory body for all institutions of higher learning in Uganda. Because factors affecting persistence are institution specific (Davidson et al., 2009; Metz, 2004), it is important to investigate factors related to the retention of students in a given institution independently from factors that could affect persistence in another institution. Moreover, as several researchers (Davidson et al., 2009; Metz, 2004) have recommended, there is no one-size-fits-all approach to understanding retention; hence, studying factors related to persistence in one university in the present study was appropriate. Selected students were studying any two of the following subject combinations: agriculture, mathematics, sports science, physics, biology, and chemistry.

Permission to administer the instruments was first sought from the university management. The university director of research on behalf of the university granted us permission to conduct the research. After we obtained clearance from the university, lecturers who taught general courses (such as psychology or educational foundations courses) were then contacted and requested to offer part of their lecture time for administering the questionnaires. All science teacher-trainees take psychology and educational foundation courses on top of the core science subjects in their curriculum. It is in such general courses that one can find all science teacher-trainees with various subject combinations studying together. Questionnaires were administered during the general professional course lectures.

Contacts with the concerned lecturer were made 2 weeks before the intended time for administering the questionnaires. Questionnaires were therefore administered during normal teaching hours with the help of the concerned lecturers. During questionnaire administration, the first author explained the purpose and all other relevant details about the study to the students as a way of eliciting their interest to participate in the study. After students consented to participate in the study by signing the consent forms, questionnaires were administered to the respondents, and the first author was present to give any clarifications on unclear items or other concerns raised by the respondents. Students took 15–20 min to complete the questionnaire. Any errors identified, such as missed responses, were corrected by the respondents when handing in the completed questionnaire.

Ethical clearance to conduct the study was obtained from the Research Ethics Committee of Mbarara University of Science and Technology (15/05-13) and Uganda National Council for Science and Technology (SS 3908).

Analysis

SEM using latent variables was used to examine the predictors of persistence in the present study. As Geiser (2013) asserted, the use of latent structural equation models is advantageous because (a) they estimate and adjust for measurement errors of both

dependent and independent variables and (b) they allow for estimation of reliabilities of manifest variables.

Our analytic procedure followed three stages: (a) initial data screening, (b) testing of the measurement model, and (c) fitting of the structural model. In assessing the measurement model and fitting the structural models, we assessed model fit using model fit indices including the CFI, TLI, RMSEA, and SRMR. Using a combination of these fit indices minimizes Type I and Type II error (Hu & Bentler, 1999). We followed the model fit criteria suggested by Hu and Bentler (1999), who suggested CFI/TLI values close to .95, SRMR $\leq .08$, and RMSEA $\leq .06$. All analyses were conducted in Mplus 7.4 (Muthén & Muthén, 1998–2015) using the maximum likelihood estimator.

Data screening

Following Khine's (2013) recommendation, data were initially screened to ascertain their suitability for SEM. Khine suggested four important considerations that should be examined before conducting any SEM analyses: (a) multicollinearity, (b) normality, (c) outliers, and (d) sample size. Multicollinearity among variables implies that they are highly correlated; hence, inferences made about such data may not be reliable. We assessed multicollinearity by examining correlation coefficients between the variables included in the analysis; in line with the recommendation of Kline (2005), all correlations were below .85, implying lack of multicollinearity. The presence of outliers and nonnormality will also affect the reliability of study findings (Khine, 2013); hence, it is advisable to first assess nonnormality before conducting SEM. Inspection of boxplots indicated an absence of outliers. All values for univariate skewness and kurtosis were below 3 and 10, respectively, as recommended by Kline (2011), indicating that the variables were normally distributed. The sample size was well above 200; given Tomarken and Waller's (2005) recommendation of a minimum sample size of 200, the present sample size of 278 students was acceptable for conducting SEM using a maximum likelihood estimator.

Testing the measurement model

It is always advisable to ascertain the psychometric soundness of the measurement model before inserting in the structural paths (Byrne, 2012; Geiser, 2013; Kelloway, 2015), and this informed our decision to test the measurement model using CFA. In case of inadequate fit, Byrne (2012) advised doing some model readjustments (guided by theory) until one achieves an acceptable fit between the specified model and the data.

Fitting the structural paths in the structural model

Fitting of the structural equation model was done after we developed a psychometrically fit measurement model. Path coefficients in the structural model were then examined, and if a given path coefficient was statistically nonsignificant, it was removed and the structural model estimated again. This was done to come up with a simpler (i.e., parsimonious) model that used fewer parameters to show the relationships between the study variables. In the case of the removal of certain structural paths, we used a chi-square difference test to compare the two nested models (one before the removal of the path and the other after the removal of the path) to check whether they were different.

In the modified model, we also assessed the combined effects of different motivational constructs on students' persistence. This analysis was important in assessing whether

motivational constructs contributed to students’ persistence independent of one another or whether they also interacted to contribute to students’ persistence. We conducted this analysis by including the *XWITH* option in the *MODEL* command in order to specify interactions between the latent variables. We also specified *TYPE = RANDOM* in addition to the *ALGORITHM = INTEGRATION* statement in the *ANALYSIS* command. The maximum likelihood estimator was specified in *ANALYSIS* as it gives robust standard estimates when using a numerical integration algorithm (Wang & Wang, 2012).

Results

Preliminary results

Demographic characteristics of the sample

Students ranged in age from 18 to 34 years, with a mean age of 22 years (*SD* = 2.3). The majority of the students were male (84.9%), resided off campus (70.1%), were privately sponsored (54.3%), and were not engaged in some form of full-time or part-time job (92.8%). Approximately equal numbers of students were in their third and second years of study (i.e., 28.8% vs. 30.90%, respectively), whereas the rest were in their first year of study. The students’ mean grade point average was 3.42 (*SD* = 0.46). A larger number of students (108 students; 38.8%) joined the university because they were offered scholarships at this university, although others (80 students; 28.8%) joined because the university offered the academic program (i.e., bachelor of science with education) that they wanted to study. A total of 64 students enrolled at this university because of its academic reputation, yet 17 students (6.1%) joined this university only because it was close to their homes. The rest of the students enrolled because the university was recommended by some other person (nine students; 3.3%).

Descriptive analyses, skewness, kurtosis, and correlation matrix for the variables used in the analysis

The means of the indicator variables ranged from 25.24 to 0.53, standard deviations ranged from 20.16 to 0.30, skewness ranged from –1.11 to 0.17, and kurtosis ranged from –0.60 to 1.40. In line with theory, all of the variables included in the analysis were

Table 1. Descriptive statistics, skewness, kurtosis, and correlation matrix for the variables in the analysis.

Variable	1	2	3	4	5	6	7	8
1. SE1	—							
2. SE2	.50**	—						
3. TV1	.28**	.21**	—					
4. TV2	.31**	.33**	.46**	—				
5. AGE	.13*	.15*	.15*	.22**	—			
6. PAT	.10	.25**	.22**	.10**	.44**	—		
7. AI	.22**	.16**	.20**	.27**	.24**	.23**	—	
8. SI	.08	.09	.11	.15*	.21**	.11**	.41**	—
<i>M</i>	5.22	5.96	5.63	5.97	18.45	25.24	0.82	0.53
<i>SD</i>	1.29	0.77	1.28	1.08	13.69	20.16	0.29	0.30
Skewness	–0.55	–0.85	–0.77	–1.26	–0.91	–1.11	–0.59	0.17
Kurtosis	–0.11	0.05	–0.15	1.22	1.10	1.40	–0.60	–0.17

Note. SE1 = Parcel 1 for self-efficacy; SE2 = Parcel 2 for self-efficacy; TV1 = Parcel 1 for task value; TV2 = Parcel 2 for task value; AGE = agency; PAT = pathways; AI = academic integration; SI = social integration.

* *p* < .05. ** *p* < .01.

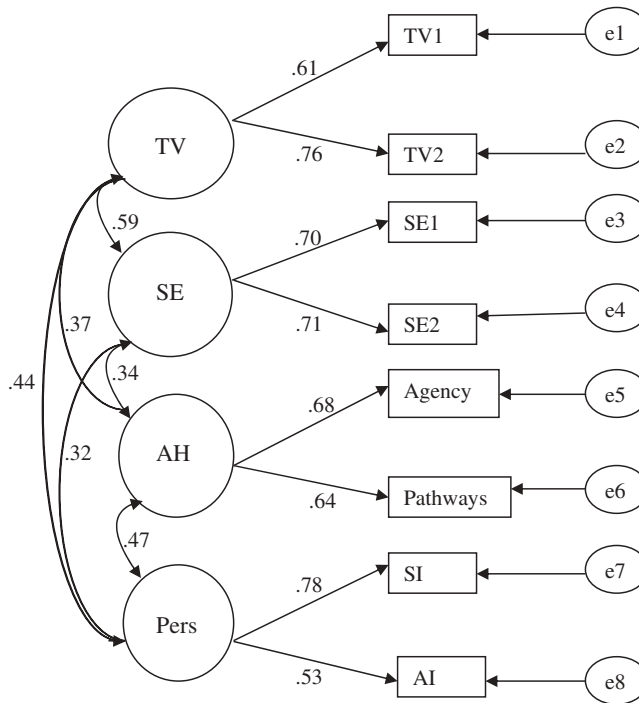


Figure 2. Measurement model for the latent variables that were included in the structural model. Standardized parameter estimates are indicated in the model. TV = task value; SE = self-efficacy; AH = academic hope; Pers = persistence; TV1 = Parcel 1 for task value; TV2 = Parcel 2 for task value; SE1 = Parcel 1 for self-efficacy; SE2 = Parcel 2 for self-efficacy; SI = social integration; AI = academic integration; e1–e8 = measurement errors for the different variables.

positively correlated, as indicated in Table 1. However, there were nonsignificant correlations between social integration and self-efficacy.

Testing the measurement model

The measurement model showed an adequate fit with the data (CFI = .963, TLI = .925, RMSEA = .060, SRMR = .029), and hence there was no need to modify this measurement model. The loadings on the latent variables ranged from .78 to .53 (see Figure 2) and were significantly greater than .40, as recommended by Matsunaga (2010), which indicates that these manifest variables adequately explained the underlying latent variables.

Assessment of the structural model

Fitting in of the structural paths in the measurement model did not change the model fit indices, and the model fit our data very well. However, the standardized model results indicated that the path from self-efficacy to persistence ($\beta = .028$, $p = .827$) was not statistically significant; hence, it was removed and the model estimated again.

The revised model (RMSEA = .052, CFI = .980, TLI = .951, SRMR = .024) even fit much better than the initial model, as indicated by CFI and TLI values close to 1. A chi-square difference test indicated no significant differences between the modified model (after the removal of the nonsignificant path) and the initial model (before the removal of

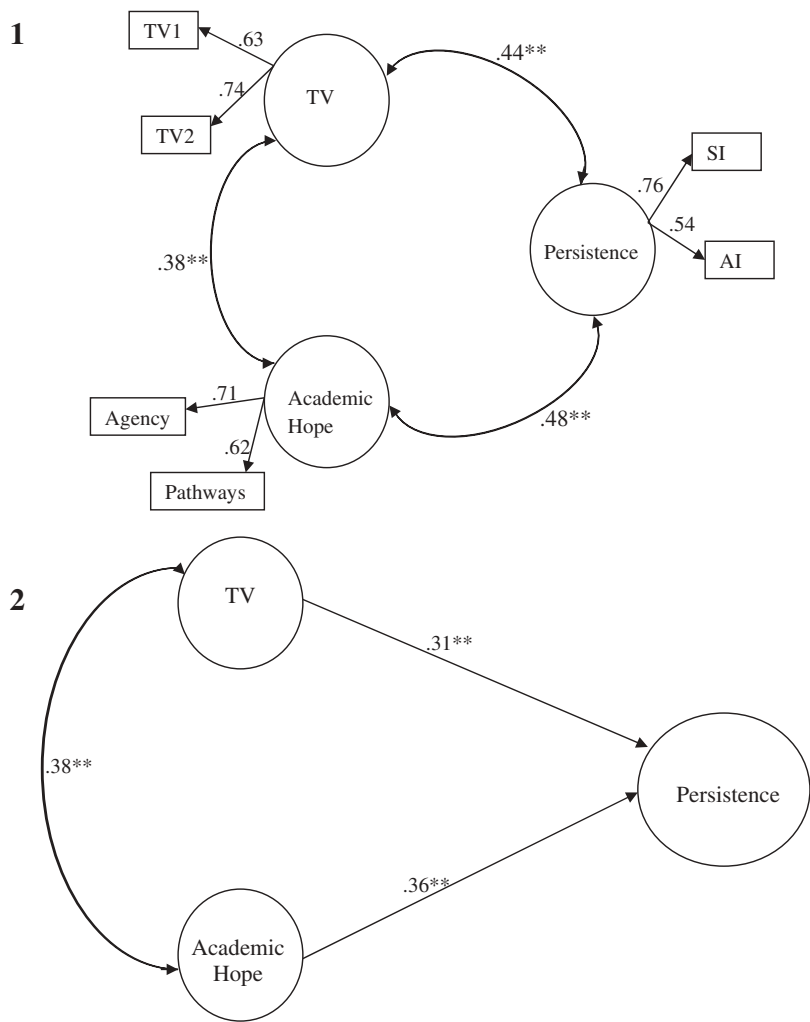


Figure 3. Task value and hope as predictors of persistence. Observed variables for Model 2 are the same as for Model 1. Standardized parameter estimates are indicated in the models. Factor loadings in Figure 3 (Model 1) are changed slightly from those in Figure 2 because self-efficacy was removed from the model. TV = task value; SI = social integration; AI = academic integration; TV1 = Parcel 1 for task value; TV2 = Parcel 2 for task value. ** $p < .05$.

the nonsignificant path). In fact, the modified model was preferred because it was more parsimonious, as it used fewer parameters to indicate the relationships between the study variables.

As shown in Figure 3 (Model 1), the relationships among academic hope, task value, and persistence were statistically significant. Academic hope and persistence shared 23% of the variance ($R^2 = .48$). Task value and persistence shared 19% common variance ($R^2 = .44$), whereas academic hope and task value shared 14% of the variance ($R^2 = .38$). These results indicate that academic hope was a stronger single explanatory factor of persistence than task value among these Ugandan science teacher-trainees.

Table 2. Goodness-of-fit indices.

Model	χ^2	<i>df</i>	CFI	TLI	SRMR
Models 1 and 2	10.51	6	.98	.95	.024
Model 2a ($\beta_{\text{task value}} = 0$)	18.59	7	.95	.90	.041
Model 2b ($\beta_{\text{hope}} = 0$)	21.71	7	.94	.90	.053

Note. CFI = comparative fit index; TLI = Tucker–Lewis index; SRMR = standardized root-mean-square residual.

We then examined the unique contributions of academic hope and task value above and beyond each other by analyzing the R^2 increments based on the comparison of variability in persistence shown in Models 1 and 2. In Model 2, both task value and academic hope accounted for 31% of the variance in persistence; hence, task value contributed an additional 8% ($\Delta R^2 = .31 - .23 = .08$) of the variance in persistence beyond the single academic hope explanatory factor. The unique contribution of academic hope to predicting persistence beyond the task value factor was 12% ($\Delta R^2 = .31 - .19 = .12$). These results further confirm that the contribution of academic hope to predicting persistence was higher than that of task value.

We also examined the unique contribution of task value and academic hope to persistence by constraining each of the related beta weights to zero and then evaluating the corresponding chi-square changes in Model 2. The unique contribution of each variable to predicting persistence is significant if there is a significant decrease in the chi-square on constraining the beta weights to zero. Constraining the beta weights to zero in both Model 2a ($\beta_{\text{task value}} = 0$) and Model 2b ($\beta_{\text{academic hope}} = 0$) resulted in significant chi-square changes: Model 2a ($\beta_{\text{task value}} = 0$), $\Delta\chi^2(1, N = 278) = 8.076, p < .05$; Model 2b ($\beta_{\text{academic hope}} = 0$), $\Delta\chi^2(1, N = 278) = 11.196, p < .05$. The results indicate the significant unique contribution of task value and academic hope as predictors of persistence. The fit indices are presented in Table 2.

Multigroup analysis further indicated that although the model fit the data very well (with a nonsignificant chi-square value, CFI and TLI values greater than .95, a RMSEA of .055, and a SRMR of .053) for both male and female students, the model provided a better fit for male students ($\chi^2 = 9.098$) than for female students ($\chi^2 = 19.222$). However, this could be accounted for by the disproportionate numbers of female and male students in the sample.

Last, the interaction effect ($\beta = -.145, p = .123$) of task value and academic hope on persistence was not statistically significant. This therefore implies that task value and academic hope contribute to students' persistence independent of each other.

Discussion

In the present study, we examined the predictors of persistence among science teacher-trainees in Uganda. Specifically, we examined the extent to which self-efficacy, task value, and academic hope predicted students' persistence. Findings indicated that task value and hope (but not self-efficacy) significantly predicted students' persistence independent of each other. The unique contribution of hope was higher compared to that of task value in influencing students' persistence.

Our results revealed that self-efficacy did not predict students' persistence, a result that converges with previous study findings (Bong, 2001; Nakajima et al., 2012). Given that various scholars have demonstrated that self-efficacy predicts persistence (Choi et al., 2010; Wigfield & Eccles, 2000), this study finding is indeed puzzling. This finding about self-efficacy could be explained by the low intrinsic motivation exhibited by learners who join teacher-training institutions in Uganda. A World Bank (2012) report has shown that many students in Uganda join the teaching profession after failing to attain the prerequisite grades and/or tuition fees required for admission to their preferred degree programs, such as medicine and surgery, pharmacy, and engineering, which are considered to be prestigious. A bachelor's degree program in science education is therefore seen as a last-resort degree program, and hence it literally becomes the only available alternative choice for frustrated students who failed to get admitted to other favorite degree programs. Because these students are enrolled in programs that they inherently did not want to pursue, we believe that they are under the influence of external drives rather than being intrinsically motivated.

Moreover, Bastick (2000) indicated that many students in developing countries join the teaching profession mainly for extrinsic reasons compared to students in developed countries, who join the profession for altruistic reasons. The low levels of intrinsic motivation among these learners significantly lower their confidence in their abilities to perform certain tasks, hence the low self-efficacy beliefs among these students. Schunk (1991) asserted, "In conditions of external influence, efficacy is a poor predictor of persistence" (p. 221), and this explains the lack of influence of self-efficacy on persistence with the current sample.

In addition, these findings have practical implications with respect to the training and handling of these teacher-trainees. First, as a way of enhancing their self-efficacy, learners could be helped to set their own achievement goals. Proximal (short-term) goals have been demonstrated to increase students' efficacy significantly compared to distant and more general goals (Schunk, 1991). When students set attainable proximal and realistic goals for themselves, they experience an initial sense of efficacy for attaining these goals, regularly rehearse information, and persist for longer periods of time (Schunk, 1991). Moreover, goal setting should be complemented by the provision of timely and frequent feedback to students on their goal realization progress, which further heightens students' efficacy and motivation toward a particular academic task. This requires lecturers of teacher-trainees to work closely with students in guiding them to develop a strong sense of efficacy. Goal setting, especially the use of proximal and self-set goals, has been shown to enhance learners' self-efficacy in a number of intervention studies (see Bandura & Schunk, 1981; Schunk, 1985).

Second, instructors of teacher-trainees should act as good role models for students. Peer and teacher models can boost students' self-efficacy beliefs (Schunk, 1991). When students observe fellow students or their teachers succeed in a particular academic task, it gives them confidence that they too can also succeed. Zimmerman and Ringle (1981) showed that children who observed a highly persistent model on a given task also exhibited high persistence in similar tasks. Moreover, Relich, Debus, and Walker (1986) showed that children achieving poorly in mathematics had increased efficacy and persistence when they were exposed to models explaining division in mathematics. In addition,

teachers with low self-efficacy tend to avoid teaching content that they themselves do not comprehend well, are not patient with learners with learning difficulties, and do not take enough time preparing materials for teaching (Schunk, 1991). Therefore, we recommend a process of introspection among academic staff of teacher-trainees, in which the lecturers first examine and refine their efficacy beliefs. University lecturers should avoid showing behaviors related to incompetence, defeatism, pessimism, low self-esteem, and so on to their students, as these behaviors are later modeled by their teacher-trainees and could later be passed on to their future learners.

The result about the positive contribution of task value to persistence converges with previous findings (Eccles & Wigfield, 1995; Meece et al., 1990; Wigfield & Eccles, 1992; Wigfield et al., 1996). Learners who perceive academic tasks as being helpful, say, in their future employment, exhibit high levels of persistence in their studies and strategically plan how to accomplish their goals. When tasks are valued, students use a variety of learning strategies and are cognitively more engaged compared to when tasks are viewed as being useless to these students. We therefore recommend that lecturers employed in teacher-training institutions demonstrate the relevance of the taught content. This can be achieved by focusing on the real-world application of the study content. Study materials and learning content should therefore respond to societal and community needs where these learners stay if they are to be valued. For example, when learning about the topic of ecology in biology, learners should be shown the relevance of preserving their environments, with particular reference to any environmental problems within the learners' communities.

Last, the present study has also demonstrated the influence of students' hope on their persistence. In fact, hopeful thinking predicted persistence more strongly than task value and self-efficacy. Our study findings contradict those of Madison (2009), who found that self-efficacy predicted the persistence of students more than hope did when these two constructs were put in the same regression model. In contrast, the present findings are in line with results by Magaletta and Oliver (1999), who suggested that although agentic thinking and self-efficacy influence persistence, the former predicts well-being much more than the latter. This therefore implies that the predictive power of hope and self-efficacy depends greatly on the psychological construct under investigation.

Although research on academic hope among teacher-trainees is still in its infancy, the fact that hope predicted persistence much more strongly than task value and self-efficacy portrays hope as a vital construct that should be given its due attention in educational research. There is also a need to enhance hopeful thinking among teacher-trainees for successful completion of their degree programs. Hopeful thinking can be improved by strengthening both students' agency/willpower and their pathways thinking. It is always advisable to help students set realistic achievement goals that may act as a benchmark in assessing their academic progress. In addition, learners should be able to break down their long-term goals into smaller, manageable subgoals that can be attained within a stipulated period of time. The relevance of goals in determining students' motivation and persistence was already discussed at the beginning of this section.

However, interventions to strengthen students' hope should be preceded by actual assessment of students' hope levels, and this could be achieved using the hope scale. Depending on the results, some students might score low on agency, others may be inept

at pathways thinking, and hence appropriate interventions should be designed after understanding an individual's weakness.

Learners should also be trained and encouraged to be positive about themselves in pursuit of their goals. Such positive voices and comments as "I can achieve this" or "I am good at mathematics" are a source of efficacy and self-confidence that keep students focused as they pursue their goals. Last, learners should be advised to develop multiple pathways to achieving their goals such that they have a fallback position in case a given strategy is not working well.

Conclusion

The present study has highlighted the unique contributions of motivational attributes (i.e., task value and academic hope) to the persistence of science teacher-trainees. As noted in the discussion, there is a need to make learning content relevant to teacher-trainees in terms of their future employment and in responding to the problems and needs in their communities.

Instructors in teacher-training institutions should focus on the applicability of the concepts taught to the preservice science teachers in order to enhance their task value. In addition, science teacher-trainees should be helped to set realistic goals and adopt adaptive strategies for attaining their goals. Such interventions will enhance not only the students' hope of completing their studies but also their task value and self-efficacy. As noted earlier, high levels of academic hope, task value, and self-efficacy will ultimately contribute to students' persistence.

Teacher-training institutions in Uganda are therefore faced with the challenge of restructuring their institutional practices through providing enough support services to science teacher-trainees to boost their motivation and persistence in studies. Such interventions require the concerted efforts of not only university administrators but also teacher-trainee instructors and the teacher-trainees themselves. On this note, we echo Tinto's (2006–2007) assertion:

The really difficult work of shaping institutional practice, in particular for low-income students, has yet to be tackled. That work requires us to leave our retention fiefdoms and join forces with larger educational movements that seek to restructure the way we go about the task of educating all and not just some of our students. It is that larger educational task that we must now turn to. (p. 13)

Although this study is the first of its kind to examine the contributions of different motivational factors to the persistence of science teacher-trainees in the Ugandan context, it is in no way an exhaustive examination of the various factors associated with persistence among teacher-trainees in Uganda. However, it ultimately opens up a fresh line of inquiry into the challenge of higher education retention, which Ugandan teacher-training institutions have silently grappled with in the past years. Nevertheless, it is our firm conviction that the present study findings provide baseline results on which more studies examining retention and persistence among teacher-trainees could be designed.

Because factors affecting students' persistence differ from one institution to another, teacher-training institutions in Uganda should conduct more research and allocate the

resources needed to develop student-focused interventions that suit their specific institutional contexts.

Limitations

The findings discussed here should be interpreted in light of some theoretical and methodological limitations. First, the present study utilized self-report measures to assess the study variables. Self-report measures are vulnerable to social desirability (Dodaj, 2012), a situation in which one responds to items in such a way as to appear good. Therefore, students' scores on the study variables in the present study could have been affected by social desirability to some extent. However, it would be advisable to triangulate and validate these quantitative study findings with qualitative data obtained from observations, focus group discussions, and personal interviews. In fact, a mixed-methods approach provides a much deeper understating of a phenomenon under study than a single-method approach does. In our case, the lack of statistically significant associations between self-efficacy and students' persistence could have been interrogated further using qualitative methods for much deeper insight.

Second, in the present study, we utilized a sample of science teacher-trainees enrolled on a full-time basis at their university; hence, consideration should be given, when generalizing the study findings, to other student populations that may differ theoretically from the current sample. For example, students in the arts and humanities could have different motivational patterns from the science teacher-trainees in the present study. In fact, the disproportionate numbers of female and male students in the present sample may have some theoretical implications on the current study findings. Therefore, we propose that more studies be carried out with other student populations to validate our study findings.

Last, findings from the present study were based on a cross-sectional research design. Hence, causal relationships between the study variables cannot be inferred.

Disclosure Statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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Appendix

Study Questionnaire

Dear Student,

You have been selected to participate in a study titled “Determinants of Persistence among Science Teacher-trainees: Examining the role of self-efficacy, task value and academic hope.” This questionnaire is designed to examine the extent to which different motivational beliefs and academic hope predict persistence of science teacher-trainees.

Please respond to each item honestly and frankly by putting a tick (✓) to the choice that reflects your own experience. Other items request you to fill in some details. There are no right or wrong choices. All the data collected will be highly confidential and used for the research purposes only.

Section One: Bio data

Age: years

Sex: a) Male b) Female

Year of Study: a) One b) Two c) Three

Status: a) Resident b) Non-resident
Sponsorship: a) Government b) Private
Are you engaged in some full time/part-time job elsewhere? a) Yes b) No
Current Grade Point Average or Cumulative Grade Point Average:
Why did you join this university?
a) University academic reputation b) Most of my friends are in this university c) Had the course I wanted d) Recommended by some other person e) Closer to my home f) Scholarship/sponsorship reasons

Section Two: Scales assessing motivational beliefs, academic hope and persistence
Part 1: Motivational beliefs

	1. Not true of me at all	2.	3.	4.	5.	6.	7. Very true of me
<i>Task value scale</i>							
I think I will be able to use what I learn in this degree program in my life							
It is important for me to learn the course material in this degree program							
I am very interested in the content area of my degree program							
I think the course material in this degree program is useful for me to learn							
I like the subject matter of this degree program							
Understanding the subject matter of this degree program is very important to me							
<i>Self-efficacy scale</i>							
I believe I will receive an excellent grade in my class							
I'm certain I can understand the most difficult material presented in the readings for this program							
I'm confident I can learn the basic concepts taught in this program							
I'm confident I can understand the most complex material presented by the instructor in this program							
I'm confident I can do an excellent job on the assignments and tests in this program							
I'm certain I can master the skills being taught in this program							

Part 2: Academic hope

	1. Definitely false	1. Mostly false	1. Somewhat false	1. Slightly false	1. Slightly true	1. Somewhat true	1. Mostly true	1. Definitely true
<i>Pathways scale</i>								
I can think of many ways to get out of academic difficulties								
There are lots of ways around any academic problem								
I can think of many ways to do well in classes that are important to me								
Even if the course is difficult, I know I can find a way to succeed								
<i>Agency scale</i>								
I energetically pursue my academic goals								
I have been pretty successful in my school life								
My past academic experiences have prepared me well for my academic future								
I meet the academic goals that I set for myself								

Part 3: Persistence*Social integration scale*

What is your overall impression of the other students at this university?

- (a) very favourable (b) somewhat favourable (c) neutral (d) somewhat unfavourable
(e) very unfavourable (f) not applicable

How strong is your sense of connectedness with others (faculty, students, and staff) on this campus?

- (a) very strong (b) somewhat strong (c) neutral (d) somewhat weak (e) very weak
(f) not applicable

When you think about your overall social life here (friends, college organizations, extracurricular activities, and so on), how satisfied are you with your social life here?

- (a) very satisfied (b) somewhat satisfied (c) neutral (d) somewhat dissatisfied
(e) very dissatisfied (f) not applicable

How much have your interactions with other students had an impact on your intellectual growth and interest in ideas?

- (a) very much (b) much (c) some (d) little (e) very little (f) not applicable

How much do you think you have in common with other students here?

- (a) very much (b) much (c) some (d) little (e) very little (f) not applicable

How often do you wear clothing with this universities emblem?

- (a) very often (b) somewhat often (c) sometimes (d) rarely (e) very rarely
(f) not applicable

Academic integration scale

On average across all your courses, how interested are you in the things that are being said during class discussions?

- (a) very interested (b) somewhat interested (c) neutral (d) somewhat disinterested (e) very disinterested (f) not applicable

In general, how satisfied are you with the quality of instruction you are receiving here?

- (a) very satisfied (b) somewhat satisfied (c) neutral (d) somewhat dissatisfied (e) very dissatisfied
(f) not applicable

How well do you understand the thinking of your instructors when they lecture or ask students to answer questions in class?

- (a) very well (b) well (c) neutral (d) not well (e) not at all well (f) not applicable

How satisfied are you with the extent of your intellectual growth and interest in ideas since coming here?

- (a) very satisfied (b) somewhat satisfied (c) neutral (d) somewhat dissatisfied (e) very dissatisfied
(f) not applicable

How much of a connection do you see between what you are learning here and your future career possibilities?

- (a) very much (b) much (c) some (d) little (e) very little (f) not applicable

How concerned about your intellectual growth is the faculty staff here?

- (a) very concerned (b) somewhat concerned (c) neutral (d) somewhat unconcerned (e) very unconcerned (f) not applicable

How would you rate the quality of the instruction you are receiving here?

- (a) excellent (b) good (c) fair (d) poor (e) very poor (f) not applicable

Thank you very much for your time.