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An examination of achievement goals in learning: A quasi-quantitative approach

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Abstract

Introduction. The achievement goals framework has been researched and used to explain and account for individuals' learning and academic achievements. Over the past three decades, progress has been made in the conceptualizations and research development of different possible theoretical models of achievement goals. Notably, in this study, we explored the 2 × 2 achievement goal model.

Method. Expanding this area of inquiry, and unlike previous research studies, we used an open-ended survey to explore the definition (mastery-performance) and valence (approach-avoidance) dimensions of achievement goals. Furthermore, differing from previous methodological approaches, we situated the items for students' responses in the context of secondary school mathematics learning. One hundred and sixty-nine (75 girls, 94 boys) Year 12 students participated in this research study. Open-ended responses were coded and analyzed using the software package, SPSS Text Analysis for Surveys 2.1.

Results. Thematic analyses resulted in the categorization and identification of key words and themes. Frequency count arising from content analyses also indicated the potency of themes such as future development, external influences, and personal gratification.

Discussion. By means of extrapolation and interpretation, we derived five refined facets for discussion: future development and aspirations, relevance and uniqueness of subject, extraneous forces, personal attributes, and attribution/motivation.

Keywords: Achievement goals; quasi-quantitative, mathematics learning; open-ended approach

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Una exploración de metas de logro en el aprendizaje: un enfoque cuasi-cuantitativo

Resumen

Introducción. El marco de las metas de logro ha sido investigado y se utiliza para explicar y dar cuenta de aprendizaje de los individuos y de sus logros académicos. Durante las últimas tres décadas, se ha avanzado en la conceptualización y el desarrollo de la investigación de los diferentes posibles modelos teóricos de las metas de logro. Cabe destacar que en este estudio, hemos explorado el modelo de 2 × 2 metas de logro.

Método. Para la ampliación de esta área de investigación, ya diferencia de los estudios de investigación anteriores, se utilizó una encuesta abierta para explorar las dimensiones de definición (dominio rendimiento) y valencia (aproximación-evitación) de las metas de logro. Además, a diferencia de anteriores enfoques metodológicos, se sitúan los elementos de respuestas de los estudiantes en el contexto de la escuela secundaria el aprendizaje de las matemáticas. Ciento sesenta y nueve estduantes (75 niñas, 94 niños) del doceavo curso participaron en este estudio de investigación. Las respuestas abiertas se codificaron y analizaron mediante el paquete de software, SPSS Text Analysis for Surveys 2.1.

Resultados. Se realizaron análisis temáticos de resultados, en la clasificación e identificación de palabras clave y temas. Recuentos de la frecuencia resultante de los análisis de contenido también indicaron la potencia de temas como el desarrollo futuro, las influencias externas, y la gratificación personal.

Discusión. Por medio de la extrapolación y la interpretación, se obtuvieron cinco facetas refinadas para el debate: el desarrollo futuro y las aspiraciones, la pertinencia y la singularidad del sujeto, las fuerzas de extrane-sos, los atributos personales, y la atribución / motivación.

Palabras clave: metas de rendimiento escolar; análisis cuasi-cuantitativos, aprendizaje matemático; enfoques abiertos-cerrados

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Introduction

From an educational psychology perspective, the achievement goals framework has been used to explain and predict students' cognition, motivation, and learning outcomes (Ames & Archer, 1988; Elliot, McGregor, & Gable, 1999; Elliott & Dweck, 1988; Pintrich, 2000a). Over the past three decades, a number of theoretical perspectives of achievement goals have been proposed and tested in different educational contexts and sociocultural settings. Notably, there is progression made in terms of conceptualization and research development of the various theoretical models of achievement goals – for example, the multiple goals model of achievement goals. Different educational contexts, levels, and situations have led to research inquiries involving the various achievement goals models. We attempt to advance this inquiry, theoretically and empirically, by studying achievement goal orientations in the context of secondary school learning. Significantly, differing from other quantitative examinations (e.g., Elliot, et al., 1999; Elliot & Murayama, 2008; Elliot, Shell, Henry, & Maier, 2005; Midgley, et al., 1998), we used a mixed methodological approach (Hanson, Creswell, Clark, Petska, & Creswell, 2005; Tashakkori & Teddlie, 2003) to explore secondary school students' goal orientations in the learning of mathematics.

Achievement goals

The achievement goals framework is central to our understanding of motivation in achievement settings (Elliot & Murayama, 2008). As a definition, achievement goals are defined as "competence-relevant aims that individuals strive for in achievement settings" (Pekrun, Elliot, & Maier, 2009, p. 115). During the past three decades, researchers have studied the achievement goals framework (Ames & Archer, 1988; Dweck, 1990; Elliott & Dweck, 1988) with students of different educational levels and in various educational contexts. Mixed findings and the need to explain individuals' patterns of cognition, motivation, and behaviors have led to progression and different proposed theoretical models of achievement goals (Harackiewicz, Barron, & Elliot, 1998; Harackiewicz, Barron, Pintrich, Elliot, & Trash, 2002). The dichotomous model of achievement goals (Dweck, 1986; Dweck & Leggett, 1988; Nicholls, 1984), initially, acknowledged a mastery-performance distinction, wherein the mastery categorization emphasizes the development of competence, and the performance categorization focuses on the demonstration of competence (Pekrun, et al., 2009). A bifurcation of the performance categorization into two distinctive components, approach versus avoidance, resulted in a trichotomous model of achievement goals (Elliot & Church, 1997; Elliot &

Harackiewicz, 1996). The trichotomous model, differing from the dichotomous model, acknowledges the performance goal construct differentiating into two separate goal entities: an avoidance goal orientation that focuses on individuals avoiding negative possibilities (e.g., failure or looking incompetent, normatively), and an approach goal orientation that focuses on individuals acquiring positive possibilities (e.g., attaining competence and demonstrating superiority)(Van Yperen, Elliot, & Anseel, 2009). More recently, empirical research, albeit limited, has lent support for the bifurcation of the mastery goal construct into separate approach and avoidance goals, hence, the coining of the 2 × 2 theoretical model (Elliot, 1999; Elliot & McGregor, 2001). For the 2 × 2 achievement goal model, a mastery-approach goal orientation emphasizes on the attainment of task-based or intrapersonal standards of competence, whereas a mastery-avoidance goal orientation focuses on one attempting to avoid task-based or intrapersonal standards of incompetence.

The achievement goals framework, notably, the trichotomous model, has been researched extensively in various educational contexts. There is substantial experimental and correlational research by Elliot and colleagues to show and validate the distinctiveness of mastery, performance-approach, and performance-avoidance goal orientations (e.g., Church, Elliot, & Gable, 2001; Elliot, et al., 1999; Elliot, et al., 2005; Pekrun, et al., 2009). Unlike the trichotomous model of achievement goals, research involving the 2 × 2 model has been limited (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Van Yperen, et al., 2009) and, consequently, some researchers have even questioned its validity and/or inclusion (Deshon & Gillespie, 2005). The is evidence to illuminate, in part, distinctive patterns in relation to achievement goals and cognitive strategies, motives, self-beliefs, and academic performance outcomes (see, for example, Pekrun, et al., 2009). The potency of the trichotomous model of achievement goals is reflected, for example, by close associations between a mastery goal orientation and a myriad of positive behaviors, such as a preference for challenging work (Ames & Archer, 1988; Elliott & Dweck, 1988), persistence (Elliott & Dweck, 1988), intrinsic motivation for learning (Meece, Blumenfeld, & Hoyle, 1988; Stipek & Kowalski, 1989), the use of deep processing strategies (Ames & Archer, 1988; Dupeyrat & Mariné, 2005; Fenollar, Román, & Cuestas, 2007; Liem, Lau, & Nie, 2008; Meece, et al., 1988; Nolen & Haladyns, 1990; Senko & Miles, 2008), reflection (Phan, 2009b), and effort expenditure (Chouinard, Karsenti, & Roy, 2007; Fenollar, et al., 2007). Similarly, from a social cognitive perspective (Bandura, 1986, 1997), mastery goals also relate positively with personal self-

efficacy (Fenollar, et al., 2007; Greene, Miller, Crowson, Duke, & Akey, 2004; Liem, et al., 2008). In this analysis, individuals who are self-efficacious in their learning of a subject matter are more inclined towards a mastery goal orientation.

Empirical research studies have also reported findings that indicate close associations between performance-approach goals and adapting learning behaviors, such as higher aspiration, absorption during task engagement and performance attainment (Elliot, et al., 1999), and the adoption of surface cognitive strategies (Dupeyrat & Mariné, 2005; Fenollar, et al., 2007; Phan, 2010; Simons, Dewitte, & Lens, 2004). Similarly, there is evidence to show that performance-avoidance goals are related negatively with intrinsic motivation (Elliot & Harackiewicz, 1996), self-efficacy beliefs (Fenollar, et al., 2007; Liem, et al., 2008), and peer relationship (Liem, et al., 2008), and positively with learned hopelessness (Phan, 2010), task engagement (Liem, et al., 2008), and effort expenditure (Fenollar, et al., 2007). Furthermore, individuals adopting performance-avoidance goals are more disorganized in their study habits (Elliot, et al., 1999; Senko & Miles, 2008), and demonstrate more preference for the adoption of surface cognitive strategies (Liem, et al., 2008; Phan, 2009c; Simons, et al., 2004).

Research underpinning the trichotomous model of achievement goals has also reported evidence that accentuates the relations between mastery, performance-approach, and performance-avoidance goals and academic performance. Correlational analyses within the framework of structural equation modeling have yielded findings showing the positive effect of mastery goals on academic performance (Tanaka & Yamauchi, 2001; Vansteenkiste, Simons, Lens, Soenens, & Matos, 2004). Similarly, academic performance is associated positively with students' orientation of performance-approach goals (Church, et al., 2001; Durik, Lovejoy, & Johnson, 2009; Senko & Miles, 2008; Wolters, 2004), and negatively with performance-avoidance goals (Durik, et al., 2009; Elliot, et al., 1999).

The 2×2 model of achievement goals has emerged recently as a central focus for conceptualization and research development. There is currently ongoing research, albeit limited, to discern the four different types of goal orientations that have been advocated (Elliot & McGregor, 2001). Elliot and Murayama (2008), for example, developed a revised Achievement Goal Questionnaire (Elliot & McGregor, 2001) to assess students' achievement goal orientations in undergraduate learning. Structural equation modeling revealed that the AGQ-Revised showed good predictive and construct validity: both mastery-approach and perform-

ance-avoidance goals exerted positive ($\rightarrow \beta = .28$) and negative ($\rightarrow \beta = -.15$) effects on intrinsic motivation, respectively. Similarly, with the exception of mastery-approach and mastery-avoidance goals, both performance-approach ($\rightarrow \beta = .46$) and performance-avoidance ($\rightarrow \beta = -.48$) goals influenced exam performance in psychology. In a recent experimental study, Van Yperen, et al. (2009) reported similar findings, suggesting that a mastery-avoidance goal, when compared to the three achievement goal types, is more detrimental in the learning process. Likewise, Alkharusi and Aldhafri's (2010) factorial invariance examination undergraduate students also supported the factor structures of the AGQ-Revised across gender.

In summation, the achievement goals theory is central to our understanding of cognition, motivation, and learning outcomes in educational contexts. The various models of achievement goals, including the multiple-goals perspective (Pintrich, 2000b) which we did not detail, have also been researched with other variables in totality within the framework of structural equation modeling. Such examination details the intricate associations between the various achievement goal types and other variables that are involved in the learning process (e.g., hope)(Elliot, et al., 1999; Fenollar, et al., 2007; Hulleman, Durik, Schweigert, & Harackiewicz, 2008; Liem, et al., 2008; Pekrun, et al., 2009; Phan, 2009a; Senko & Miles, 2008; Simons, et al., 2004). Despite clear and, in part, consistent evidence that accentuates the predictive and construct validity of the various types of achievement goals, we believe there is still more emphasis needed with reference to the 2×2 model. Unlike the dichotomous and trichotomous models of achievement goals, the 2×2 model is undergoing progressive research development and conceptualization (Alkharusi, 2010; Elliot & Murayama, 2008). Drawing from existing theoretical contentions and empirical findings, we present a discussion that outlines reasons for the pursuing of this inquiry involving the 2×2 model.

Conceptual framework for investigation

The premise for advancing the 2×2 model of achievement goals (Elliot, 1999; Elliot & McGregor, 2001) arises from the need for us to develop a better understanding, theoretically and empirically, of the four different types of achievement goals. An examination of the literature shows there is ongoing research and discussion pertaining to the definition and operational nature of the four different achievement goal types (see, for example, Alkharusi, 2010; Elliot & Thrash, 2001). Elliot and Thrash's (2001) proposition, for example, entails a

hierarchical framework where achievement goals are conceptualized along two dimensions: "according to how competence is defined and according to how competence is valenced" (Elliot & Thrash, 2001, p. 145). Furthermore, according to this theoretical proposition, the combination of the definition (i.e., detailing the mastery-performance distinction) and valence dimensions (i.e., detailing the approach-avoidance distinction) yields six possible types of achievement goals – an absolute-approach goal, an absolute-avoidance goal, an intrapersonal-approach, an intrapersonal-avoidance, a normative-approach, and a normative-avoidance goal. Likewise, Elliot and Murayama's (2008) recent conceptualization contends that, comparatively, there is an imbalance between the mastery-performance and approach-avoidance distinctions of achievement goals. In this case, according to Elliot and Murayama (2008), items from existing achievement goals questionnaires, such as the Achievement Goal Questionnaire (Elliot & McGregor, 2001) espouse too much emphasis and not enough attention to the approach-avoidance distinction.

The research investigation reported in this article is unique for its methodological approach to the study of achievement goals. Rather than using, say, an existing Likert-scale inventory and statistical techniques (e.g., confirmatory factor analysis) to research students' achievement goal orientations (Elliot & Murayama, 2008; Midgley, et al., 1998), we approached this focus with an open-ended approach. In contrast to previous empirical validation of different achievement goal types, we explore instead the key characteristics that define each particular goal type. Notably, taking into consideration existing theoretical tenets and empirical evidence, we advance the 2×2 model (Elliot & Murayama, 2008; Elliot & Thrash, 2001) inquiry by structuring our objectives around the two dimensions that described by Elliot and Thrash (2001). To our knowledge, very few, if any, research has yet approached the achievement goals framework with this inquiry in mind. Open-ended surveys, in this case, may provide additional enriching information about students' goal orientations for the learning of secondary school mathematics.

The emergence of some recent software packages, notably, SPSS Text Analysis for Surveys 2.1, has allowed researchers to study cognition, motivation, and learning from other non-traditional, quantitative methodological approaches. Unlike qualitative methodological examinations using, for example, NVivo 9, text analyses are quasi-quantitative in nature, enabling researchers to categorize, quantitatively, specific themes and objectives. In the context of achievement goals, for example, thematic and content analyses of open-ended surveys may

allow us to expand the two dimensions (definition dimension of competence, valence dimension of competence) that have been outlined previously (Elliot & Thrash, 2001). The definition dimension of competence, as we mentioned previously, emphasizes the mastery-performance distinction. Mastery goals in this case are concerned with intrapersonal or absolute standards of competence, and performance goals deal with normative standards of competence (Alkharusi, 2010). The valence dimension of competence, in contrast, emphasizes a distinction between approach and avoidance goals. Approach goals, in this analysis, are concerned with one achieving positive outcomes, whereas avoidance goals focus on one's desire to avoid negative outcomes. Considering this distinctiveness, and in conjunction with research involving the factor structures of achievement goals (e.g., Elliot, 1999; Elliot & Church, 1997; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Midgley, et al., 1998; Van Yperen, et al., 2009), we make attempt to explore in-depth the characteristics and nature of the definition and valence dimensions of achievement goals.

To facilitate our examination, we have surmised in Table 1 a description and sample items from Elliot and Murayama's (2008) research concerning the definition and competence dimensions of achievement goals. From a textual point of view, the sample items of the AGQ-Revised (Elliot & Murayama, 2008) contain the following key wordings: 'master', 'understand', 'learn', 'avoid', 'incomplete', 'avoid learning', 'perform well', 'relative', 'compared', 'perform better', 'worse', and 'poorly'. Our categorization of these wordings suggests there are four major distinctive themes: (i) a need for individuals to master and understand unit material (e.g., the learning and understanding of quadratic equations), (ii) a need for individuals to avoid incomplete learning and/or understanding, (iii) a need for individuals to achieve and outperform others (e.g., "I need to obtain an 'A' grade for this assignment and, more importantly, I want to come first in the class"), and (iv) a need for individuals to avoid incompetence when comparing with others (e.g., "It is important for me not to appear less incompetent than my classmates").

***Table 1*: Conceptualization for research development into achievement goal categorizations**

Categorization	Definition[1, 2]	Example of items[2]	Open-ended survey questions used in our research
Mastery-approach	Focuses on attainment of task-based or intrapersonal standards of competence.	My aim is to completely master the material presented in this class. I am striving to understand the content of this course as thoroughly as possible. My goal is to learn as much as possible.	1. List three things that you see as being important when learning mathematics. 2. List three reasons you believe account for students' success in mathematics in this class. 3. List three reasons that you believe account for students' failure in mathematics in this class. 4. What is your main objective(s) for learning mathematics in this class? 5. Describe or explain whether you believe classroom competition is important when it comes to learning mathematics. 6. Describe or explain whether you believe academic success (e.g., getting an 'A' grade for an assignment in mathematics) reflects good, effective learning. Likewise, explain whether you believe academic failure is a reflection of poor learning. 7. Does it make a difference for you (when it comes to learning mathematics) what your friends do in this class? Consider, for example, their study habits or their attitudes toward learning. 8. Do you think that competition between you and your friends in this mathematics class is positive and may stimulate learning? 9. Why is learning mathematics important for you?
Mastery-avoidance	Focuses on avoiding task-based or intrapersonal standards of incompetence.	My aim is to avoid learning less than I possibly could. I am striving to avoid an incomplete understanding of the course material. My goal is to avoid learning less than it is possible to learn.	
Performance-approach	Focuses on attaining and demonstrating competence and superiority relative to others.	My aim is to perform well relative to other students. I am striving to do well compared to other students. My goal is to perform better than the other students.	
Performance-avoidance	Focuses on avoiding incompetence relative to others.	My aim is to avoid doing worse than other students. I am striving to avoid performing worse than others. My goal is to avoid perform poorly compared to other students.	

Note: Definitions of the four types of goals are taken from Van Yperen, N. W., Elliot, A. J., & Anseel, F. (2009). The influence of mastery-avoidance goals on performance improvement. *European Journal of Social Psychology, 39*, 932-943; These items are taken from Elliot, A. J., & Murayama, K. (2008). On the measurement of achievement goals: Critique, illustration, and application. *Journal of Educational Psychology, 100*(3), 613-628.

Objetives of the present study

Consequently, in conjunction with existing theoretical contentions and empirical studies (Elliot, 1999; Elliot & McGregor, 2001; Elliot & Murayama, 2008; Van Yperen, et al., 2009), we used the key words identified as a premise for our research objectives. Notably, our examination and analyses entail the following:

i. Identify students' objectives and purposes for their learning of mathematics in classroom settings.
ii. Identify students' reasons for their desire to achieve good academic grades in mathematics.
iii. Identify students' perceptions of academic success in the learning of mathematics.

The aforementioned research objectives emphasize, in particular, the learning of mathematics. The contextualization of achievement goals, similar to previous motivational research (Walker, Pressick-Kilborn, Arnold, & Sainsbury, 2004), is integral to the study of motivation and learning. Similar to other areas of inquiries, such as students' approaches to learning (Mugler & Landbeck, 1997; Richardson, Landbeck, & Mugler, 1995; Watkins, Regmi, & Astilla, 1991; Wong, Lin, & Watkins, 1996), we contend that subject matter (e.g., the learning of, say, algebra) and contextualized settings make contributions to the shaping of one's achievement goal orientations. Administering a survey in a mathematics class does not necessarily inform us about students' deliberation of achievement goals for mathematics learning. What is called for, from our point of view, is the structuring and development of queries and/or questions that make reference to the subject matter at hand – for example, "why is the learning of mathematics in this class important to you?" In essence, this issue of contextualization may provide more accurate responses from students about their personal beliefs, desires, and objectives for learning mathematics. Consequently, our theoretical contention here is that subject matter relates closely and, more importantly, influences how students structure and orientate towards specific goals.

***Table 2*: Examples of analysis using SPSS Text Analysis for Surveys 2.1.**

Item	Examples of students' responses[1]	Examples of consolidation and categories and key terms identified	Themes emerged	Further refinement
1	• Three things as being important when learning mathematics include: (i) interesting teacher, (ii) interesting content, and (iii) learning activities. • Three things that I see as being important in the learning of mathematics: (i) interesting tasks, (ii) not too hard tests, and (iii) getting good marks. • Three things that I see as being important include: (i) fun activities, (ii) easy tasks and tests, and (iii) nice teacher.	Interesting teacher; Interesting subject; Interesting activities; Interesting tasks, good Information relevant to other subjects (e.g., physics); Contentment and happiness; Satisfaction with good academic results.	Interest and stimulation Contentment Satisfaction Ease Friends Teacher's persona Subject matter Relevance Authentic	Future development (e.g., career)(~ 146 responses) Subject matter (~ 55 responses) Personal gratification (~ 78 responses) External influences (e.g., teacher)(~ 97 responses)
9	• I believe learning mathematics is important because: (i) for my future, (ii) mathematics is important for everything, and (iii) relates to other subjects. • I believe learning mathematics is important because: (i) it helps my future careers, (ii) only mathematics is important, and (iii) it helps in logical reasoning. • I believe learning mathematics is important because: (i) it is important for my future, (ii) allow me to go to university, and (iii) my family wants me to do well.	Future orientation; Career development; Logical reasoning; Premise for other learning subjects; Professional planning; Major subject and other subjects are secondary;	Future orientation Reasoning skills Core subject Personal development Professional development Family values Public recognition Importance of subject	
2	• Three reasons that may account for academic success in mathematics: (i) working hard, (ii) smart, and (iii) others helping. • Three reasons that may account for academic success in mathematics: (i) I put in a lot of effort, (ii) time, and (iii) the subject is interesting for learning. • Three reasons that may account for academic success in mathematics: (i) working very hard, (ii) other people (e.g., father) helping with schoolwork, and (iii) easy tests.	Putting in a lot of effort; Innate capabilities; Giftedness and talents; Teachers' expertise; Teachers' knowledge and understanding; Classroom environment; Classroom organization.	Effort expenditure Time management Resilience Persistence Confidence Self-beliefs Ability Relevance of subject	Effort expenditure (~ 99 responses) Ability (~ 90 responses) External influences (e.g., teacher)(~ 125 responses) Personal beliefs (e.g., confidence)(~ 73 responses)

[1] Exact wordings were entered.

3	• Three reasons that may account for academic failure: (i) the student is lazy and doesn't want to study, (ii) the student does not want to ask for help from the teacher, and (iii) the student is not smart like other students. • Three reasons that may account for academic failure: (i) the student doesn't put enough time into his studies, (ii) the student doesn't want to try, and (iii) the student is not interested. • Three reasons that may account for academic failure: (i) difficult tests, (ii) the teacher is not friendly and doesn't to help, and (iii) the student doesn't try in his schoolwork.	Spend little time in studying; Contents are not relevant; Uninteresting tasks and activities; Genetic makeup; Tasks too difficult; Teacher favoritism; Subject contents; Peer pressure and influences not to study; Home environment and extracurricular activities.	Lack of ability Lack of effort No confidence Teacher's attitude Teacher's persona Difficult contents No relevance Uninteresting	
4	• My main objective for learning is that I want to do well to make my parents proud, and that they know I work hard in my learning. I also want to come in my tests so that the teacher knows I'm smart. • My main objective for learning is that I want to beat other students in my class. If I do well, then I will get to go to university. • My main objective for learning is that I want to go to university like other students and make my parents proud. Mathematics is important because at university everyone counts this subject.	Family values and pressure; Enjoyment; Looking good in front of others; Teacher's recognition of ability; Teacher's recognition of effort; University studies; Future career choices and professional development.	Public recognition for ability Outperform others Ambitions Future development Interest for subject Personal gratification Family commitment Peer influence	Future implications (e.g., ambitions)(~ 87 responses) Personal gratification (e.g., beating other students)(~ 66 responses) External influences (e.g., family value)(~ 71 responses) Subject matter (~ 22 responses)
6	• If you work hard, then you will understand the material. I only understand the material (e.g., doing calculus) if I can good marks. I also think that if you don't learn, you will fail your test. Usually, smart students who get good marks know more than other students. • Good students know more than other students. They usually get good marks in tests that we have. On the other hand, dumb students don't learn much. They tend to muck around and not concentrate in their studies. Smart students spend a lot of time studying. They get good marks.	Working hard is important; Understanding is reflected from academic grades; Differences between bright and lesser able students; Time management and effort expenditure in learning; Differentiation in abilities; Categorization of classes; Stronger emphasis in abilities and not effort	Personal ethos and beliefs Effort expenditure Personal ability Success-Learning Failure-No learning Differential categorization Personal preference Future path	Effort expenditure (~ 88 responses) Differential abilities (~ 80 responses) Personal attributes (e.g., beliefs what learning entails)(~ 82 responses) External influences (e.g., career choice)(~ 77 responses)

	• With good teachers, usually you can good marks in tests. When the teachers don't what they are talking about, most students will fail. Furthermore, when we get put into classes (e.g., Advanced), the good teachers usually get the top classes.	expenditure; Relation between ability and learning.		
5	• I am smart and therefore I like competition. I really like to compete with my best friends. Sometimes I come first, sometimes they come first. It really motivates me to study hard. I also know some students don't like competition because they are not so smart and they always fail. • For some of us, competition is good. We like to compete with each other to see who gets a higher mark. However, only the good students like competition. It requires us to work hard. It takes a lot of time. • Competition is a good thing as it stimulates us to work harder and to learn. We all want to come first or second in a mathematics test; this coming first would allow other people to recognize how smart we are.	Competition is needed for motivation; Preference for competition is based on ability; Differential levels of preference for competition; Competition is based on subject matter (e.g., mathematics); Competition leads to effort expenditure; Competition influences time organization.	Motivation/demotivation Effort expenditure Time management and organization Personal preference Other factors (e.g., interest) Maturity Future development Growth	Motivation and incentive (~ 202 responses) Future implications (e.g., career development)(~ 250 responses) Personal gratification (e.g., feelings of happiness)(~ 195 responses) Sociocultural influences (e.g., a sense of cultural identity)(~ 297 responses)
7	• My friends play a part in my life. Sometimes we talk together in terms of what we will do next in life. For example, one of my friends takes extra tutorial classes after school to help in mathematics; I also want to do the same thing so that I can do well. For some students, I notice, this doesn't matter – that is, what other students do. • Now that I am older, I notice that my friends make a difference what I want to do. If they do well in mathematics, I also want to do well. If they don't see something as being important, I see the same. • My friends play important roles… we share everything. We all want to do well; for example, if one of my friends does well, then I want to do well as well. Likewise, I don't my friends in the class to laugh at me or make fun of me.	Peer influences lead to career choices and professional development; A need for peer acceptance; More recognition of peers and their influences with age; Attribute of academic success and failure to peer influences; A need to feel belonged; A need to be liked friends and peers.	Cultural identity Affiliation Social belongingness Professional development Collective success/failure Attributional reasoning Peer acceptance Peer rejection	

8	• Competition is good for those students who are smart. It motivates some of us to work and study hard. In the class, we want to see who can come first in a test. For the low students, they don't like competition much because they always fail. • I don't like competition because we always have to study. Only the smart get good marks; my friend and I don't do well. We always come last in the class. The other students like competition because they like telling everyone that they come first. • I really like competition because I work much harder. It motivates me before a test to study hard and remember everything I need.	Competition is related to bright students; Competition is important for motivation; A preference for competition; Competition as a form of recognition; Competition also demotivates students; Competition is not subject-specific but generalized; Competition has long lasting effects.	Student preference Motivation/Demotivation Generality Public recognition Cultural dependency Student preference Mood and feeling dependency Pleasure and serenity	

Method

Participants

We recruited 169 (75 girls, 94 boys) Year 12 students from three government schools in the Asia-Pacific region to participate in this study. The data collected for this study formed part of a larger longitudinal research project conducted with secondary school students. In our original larger research projects, we collected data across different time points from 35 schools. Of the 35 schools available, we chose three schools randomly for examination. Unlike their counterparts, we asked this cohort to answer an open-ended survey that we have developed for this current research study.

Participation by the students was voluntary and no remuneration was provided. Students were assured of anonymity and were explained the purpose of this study. Instruments were administered in classes with the assistance of two postgraduate students. On average, for the classes across the three schools, we allocated approximately 60 minutes for students to complete the survey. Having said this, provision was also made for students to stay behind, if necessary, to complete the survey.

Instruments

Unlike previous Likert-scale inventories (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Midgley, et al., 1998), we developed and used an alternative inventory to assess students' achievement goal orientations. Methodologically a survey, especially in an open-ended format, is more advantageous than close-ended questionnaires, and may provide fruitful and in-depth information about a particular discourse (Bordens & Abbott, 2008; Fraenkel & Wallen, 2006; Gravetter & Forzano, 2009). It is appropriate to adopt this methodological approach given our research investigation is exploratory in nature, and requires open-ended questioning that may then elicit more clarity and elaborated answers.

Apart from our research objectives, we also used recent theorization and empirical evidence (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Elliot & Thrash, 2001) to develop a series of open-ended questions for students to answer (see Table 1 for items). In total, there are eight questions that emphasize on the following:

a. *The importance of mathematics learning*. Items 1, 9

These two items focus on students' perception or reason why learning mathematics in secondary school is important. For example, we speculate that one main reason for students may be that they simply want to know more about a subject matter (e.g., mastering algebraic equations involving two unknowns), thereby reflecting a mastery-approach approach goal orientation. Similarly, we speculate that some students may also place an important emphasis on the need to get good academic grades for future events, hence, reflecting a performance-approach goal orientation.

b. *Reasons to succeed in mathematics learning*. Items 2, 3

These two items focus on reasons that may account for students' successes and/or failures. For example, we posit that some students may account personal ethos and beliefs as a reason for their successes in the learning of mathematics. In a similar vein, we also contend that some students may indicate peer pressure as a possible reason for their failures.

c. *Main objective(s) for learning*. Item 4

This item is pivotal to our understanding of why students learning mathematics – for example, what their main objectives? Wanting to know more, perhaps, about a particular subject matter? Some students may pursue and learn mathematics because they like the subject, hence, reflecting the notions of task value and individual interest. This emphasis concerning task value and individual interest (e.g., "Mathematics is fun; I really like the subject") is indicative of, possibly, a mastery-approach goal.

d. *Reflection of effective learning*. Item 6

This item attempts to relate academic success (or failure) with effective (or ineffective) learning, respectively. The tenets of student approaches to learning (SAL)(Biggs, 1987; Marton & Säljö, 1976) suggest that students may orientate towards two major learning approaches in their studies: deep (i.e., the intention is for students to gain mastery, and to relate their understanding and interpretation to prior knowledge and personal experience) and surface (i.e., the main emphasis here is that students learn merely for the sake of reproducing contents without any attempt made to engage in further analysis). Subsequently, drawing from this theoretical framework, there is empirical evidence to indicate that a deep learning approach predicts academic performance and effective learning (Fenollar, et al., 2007; Liem, et al., 2008; Simons, et al., 2004; Sins, van Joolingen, Savelsbergh, & van Hout-Wolters, 2008). In a similar vein, there is research (Liem, et al., 2008; Phan, 2010; Simons, et al., 2004) to indicate that a surface learning approach is related negatively to academic performance and effective learning. Our postulation, similar to this inquiry, contends that academic success reflects effective learning; in contrast, we posit that academic failure (e.g., receiving a 'D' grade for an algebra test) is indicative of ineffective learning.

e. *Peer influence and competition in mathematics learning*. Items 5, 7, 8

We consider these three items to fit in with the context of achievement goals. Vicarious learning, according to Bandura's (1986, 1997) social cognitive learning, serves as a potent source of information in cognitive appraisal of capability. In this sense, observation of role models (e.g., parent) and/or social comparison with capable others may play a viable role in the learning process (Schunk, 1981, 1987; Schunk & Hanson, 1985; Schunk, Hanson, & Cox, 1987). A classroom environment that encourages social comparison, for example, may instill and nurture notions of competence and academic excellence (Ames, 1992; Urdan, 2004; Urdan, Kneisel, & Mason, 1999). Furthermore, instructional policies and practices that foster normative evaluation and competition (e.g., ranking students based on their previous performances) inherently contribute a performance goal structure (i.e., students adopting a performance-approach and/or performance-avoidance goals).

Items 7 and 8 focus on students' perceptions of peer influence and competition and how these facets may feature in the learning process. We contend that peer influence and competition, as a form of vicarious information, may account and explain, in part, students' achievement goal orientations. Notably, considering the tenets of achievement goal structures (Ames, 1992; Anderman & Midgley, 1997; Urdan, 2004), we believe that peer influences (e.g., pressure to engage in extracurricular activities) and

competition between students, as instructional and social practices, may stimulate performance goal orientations. In this analysis, our postulation suggests that normative evaluation and social comparison, arising for example from peer influence, may align and stimulate both performance-approach and performance-avoidance goal orientations.

In total, as we mentioned previously, this methodological approach to using an open-ended survey is different and may elicit relevant and in-depth information about students' achievement goal orientations. Despite this acknowledgement, we also note that often the case, open-ended surveys and interviews may result in divergent responses that bear very few, if any, relevance to the question at hand (Fraenkel & Wallen, 2006). It is prudent to note that information obtained, although enriching in nature, may not necessarily explain students' achievement goal orientations or their learning processes. In essence, one could say that this methodological approach is 'quasi' *a priori* and based, in part, on theoretically grounding.

Design - Data analysis

The data collected for this research study was analyzed using the software package SPSS Text Analysis for Surveys 2.1. SPSS Text Analysis for Surveys 2.1 differs from other qualitative software packages (e.g., NVivo 9, ATLAS.ti) as it may also entail, but not necessarily compulsory, a quantitative component. One could argue that analysis of data using this software package may involve two major forms, in sequence: (i) thematic analysis that allows researchers to explore, identify, and categorize themes based on the participants' responses to the survey, and (ii) content analysis that involves frequency count of a particular theme (e.g., in terms of percentage) using other software packages (e.g., Microsoft Excel, IBM SPSS 19).

SPSS Text Analysis for Surveys 2.1 is a text coding software package that analyzes open-ended responses (e.g., from a survey or interview) and assists researchers in the coding and categorization processes. As an example, open-ended responses to a particular question (e.g., "Do you believe that competition between you and your friends in this mathematics class is positive and may stimulate learning?") are first 'computed' as a set of phrases and/or sentences that then enable the software package to extract sentences, key terms, and word patterns into classified categories. Having accomplished this premise, researchers may then refine the results ascertained (i.e., classified categories established) into more definitive themes for further content analysis. The analyzed results from SPSS Text Analysis for Sur-

veys 2.1, in categories and themes, are relatively consistent given the processes of extraction and categorization are always performed in a repeatable manner.

In our first step of the analyses, we transcribed the responses fully and entered them into Microsoft Excel (2010). Each row represented a case and in total there were 169 rows (cases). Each column represented a variable (e.g., item question); in total, we had 13 columns – Column 1: Student ID; Column 2: Gender; Column 3: School; Column 4: Ethnicity; Column 5 – Column 13: Item 1 – Item 9. Where possible, the participants' responses for the nine items were transcribed fully and accurately. The second step of our analyses involved the migration of transcribed data from Microsoft Excel to the SPSS Text Analysis for Surveys 2.1 software package. As an interface, SPSS Text Analysis for Surveys 2.1 is similar to Microsoft Excel, wherein the migration and transformation of data indicated 13 columns in total. One significant aspect of SPSS Text Analysis for Surveys 2.1 is that this software allows the researcher to analyze each item of the survey separately.

Thematic analysis

In the first part of the analyses, we looked for emerging patterns and sentence structuring from the 169 responses. In this analytical procedure, we used a two-step coding procedure that has often been used in grounded theory research (Esterberg, 2002; Strauss & Corbin, 1998), wherein the main focus is in the generating of categories and then identifying possible relations between the categories (Spencer, Ritchie, & O'Connor, 2003). The two-step coding procedure is structured like an inverted triangle and involves both open coding (Esterberg, 2002; Strauss & Corbin, 1998) and focused coding (Esterberg, 2002; Lofland, Snow, Anderson, & Lofland, 2006). In open coding, we first used SPSS Text Analysis for Surveys 2.1 to analyze the responses, looking in particular for general categories that deemed prudent to the tenets of achievement goals (Elliot, 1999; Elliot & McGregor, 2001; Elliot & Murayama, 2008). In the second step of the coding, focused coding, we refined the established categories into specific themes – that is, the focused coding is dependent, in part, on the general, and possibly similar, categories ascertained in the open coding stage. Often the case, the participants show tendency to use different terms (e.g., "I want to go to university"; and "I'm very much interested to do some post-secondary studies") to describe similar facets or things (e.g., Further studies).

Content analysis

After thematic analyses, we next used IBM SPSS 19 to perform a content analysis of the recurring themes identified. Content analysis, a methodological strategy used often with both qualitative and quantitative data (Burns, 2000; Esterberg, 2002; Fraenkel & Wallen, 2006), enables examination of quantitative categorization, and the development and clarification of a particular theory (Millward, 2001; Wilson & Hammond, 2001). Content analysis, in general, involves a systematic analysis of texts where these texts may include any kind of written materials, such as books, magazines, diaries, journals, letters, minutes of meetings, transcripts of TV shows or interviews, and field notes. Interpretation of content analysis of data may involve the use of frequencies, a cross-tab table, a chi-square analysis, or narrative description derives from codes and themes (Fraenkel & Wallen, 2006). In the context of this research investigation, given the emphasis is on the potency of the various facets that espouse the four achievement goal orientations, we used frequency count (in terms of %) as a basis for our content analyses. In particular, from the focused coding themes, we looked at the frequencies of occurrence in the themes identified; this 'quantification' involved us counting and comparing the participants' responses for, say, a particular theme (e.g., Teacher's attitude).

Results

One limited aspect of SPSS Text Analysis for Surveys 2.1 is that the software package does not enable researchers to explore and identify interrelations between the various themes for different questions (e.g., item 1 and item 9). Attempts to associate or form relations between questions, similar to other qualitative approaches, are usually made intuitively by the researcher. In part, perhaps as a major limitation of qualitative approaches in research development, empirical validation of relations between themes is based on theoretical grounding and not on statistical testing. For the first part of this section, we present the results separately for each of the nine question asked. In the latter part of this results section, we described our extrapolation and interpretation of possible associations between the themes that were identified.

Themes and responses

The importance of mathematics learning

For this aspect, we identified eight themes for each of item 1 ("List three things that you see as being important when learning mathematics") and item 9 ("Why is learning

mathematics for you?"). The themes for item 1 (Interest and stimulation; Contentment; Satisfaction; Ease; Teacher's attitude; Teacher's persona; Subject matter; Relevance; Authenticity) and item 9 (Future orientation; Reasoning skills; Core subject; Personal development; Professional development; Family values; Public recognition; Importance of subject) were further refined into four major consolidated themes: Future development (e.g., career choice); Subject matter (i.e., mathematics); Personal gratification (e.g., personal pleasure); and External influences (e.g., teacher). Having ascertained the four refined themes, we went back to our original data (i.e., the participants' responses) and counted the number of responses that were made by the participants for each particular theme[2]. In total, in order of numbers, 146, 97, 78 and 55 responses were recorded for Future development, External influences, Personal gratification and Subject matter, respectively.

Reasons to succeed in mathematics learning

This facet consisted of the participants' responses for item 2 ("List thee reasons you believe account for students' success in mathematics in this class") and item 3 ("List three reasons you believe account for students' failure in mathematics in this class"). The themes emerged for these two items included Effort expenditure, Time management, Resilience, Persistence, Confidence, Self-beliefs, Ability, and Relevance of subject for Item 2, and Lack of ability, Lack of effort, No confidence, Teacher's attitude, Teacher's persona, Difficult contents, No relevance, and Uninteresting for Item 3. We refined these 16 themes into four major themes with corresponding numbers of responses: External influences (e.g., teacher)(~ 125 responses), Effort expenditure (~ 99 responses), Ability (~ 90 responses), and Personal beliefs (~ 73 responses).

Main objective(s) for learning

Consolidation of the participants' responses for Item 4 ("What is your main objective for learning mathematics in this class?") included the following themes: Public recognition for ability, Outperform others, Ambitions, Future development, Interest for subject, Personal gratification, Family commitment, and Peer influence. Our refinement of these eight themes

[2] Basically, the process here involved us counting how many times a theme (e.g., future development) was mentioned by the participants. If, for example, two participants mentioned the importance of career choice anticipation (2 responses), and four mentioned personal development (4 responses), then we would have a score of 6 for the refined theme of future development. Likewise, the mentioning of interesting teacher (1 response), teacher professionalism (2 responses), and Cultural and group identity (2 responses) will result in 3 responses for the Teacher persona theme and 2 responses for the Friends theme. In turn, the Teacher persona (3 responses) theme and the Friends (2 responses) theme resulted in 5 responses for the refined theme – External influences.

entailed four major themes: Future implications (e.g., ambitions)(~ 87 responses), External influences (e.g., family value)(~ 71 responses), Personal gratification (e.g., outperforming other students)(~ 66 responses), and Subject matter (~ 22 responses).

Reflection of effective learning

Consolidation of the participants' responses for Item 6 ("Describe or explain whether you believe academic success reflects good, effective learning. Likewise, explain whether you believe academic failure is a reflection of poor learning") included the following themes: Personal ethos and beliefs, Effort expenditure, Personal ability, Success-Learning, Failure-No learning, Differential categorization, Personal preference, and Future path. Refinement of these themes resulted in four major themes: Effort expenditure (~ 88 responses), Personal attributes (e.g., beliefs what learning entails)(~ 82 responses), Differential abilities (~ 80 responses), and External influences (e.g., career choice)(~ 77 responses).

Peer influence and competition in mathematics learning

This facet concerning peer influence and competition involved three items: Item 5 ("Describe or explain whether you believe classroom competition is important when it comes to learning mathematics"), Item 7 ("Does it make a difference for you what your friends do in this class? Consider, for example, their study habits or their attitudes toward learning"), and Item 8 ("Do you think that competition between you and your friends in this mathematics class is positive and may stimulate learning?"). Responses from the participants resulted in the following themes: Motivation/Demotivation, Effort expenditure, Time management and organization, Personal preference, Other factors, Maturity, Future development, and Growth for Item 5; Cultural identity, Affiliation, Social belongingness, Professional development, Collective success/failure, Attributional reasoning, Peer acceptance, and Peer rejection for Item 7; and Student preference, Motivation/Demotivation, Generality, Public recognition, Cultural dependency, Student preference, Mood and feeling dependency, and Pleasure and serenity for Item 8. Subsequently, our refinement included four major themes: Sociocultural influences (e.g., a sense of cultural identity)(~ 297 responses), Future implications (e.g., career development)(~ 250 responses), Motivation and incentive (~ 202 responses), and Personal gratification (e.g., feelings of happiness)(~ 195 responses).

Transcending between themes

Unlike statistical analyses that enable us to test for associations between theoretical constructs (e.g., correlation), qualitative examination is limited and is based predominantly on researchers' intuition. In this section of the analyses, we used the results established previously (i.e., individual themes) to ascertain a consolidation that could illustrate possible interrelations between the themes identified. In particular, we used the nine items and five corresponding foci developed for the survey to assist us in this process of summation. Similarly, guided by theoretical grounding, the participants' responses to the nine items were used to formulate five major theoretical facets and their intricate interrelations (see Figure 1).

Moving from left to right, we first summarized the findings ascertained into a pictorial format. With this in mind, we have the following structuring: the 'Importance of mathematics learning' focus is defined by the Future development, External influences, Personal gratification, and Subject matter themes; the 'Main objective(s) for learning mathematics' focus is defined by the Future implications, External influences, Personal gratification, and Subject matter themes; the 'Peer influence and competition in mathematics learning' focus is defined by the Sociocultural influences, Future implications, Motivation/Incentive, and Personal gratification themes; the 'Reasons to succeed in mathematics learning' focus is defined by the External influences, Effort expenditure, Ability, and Personal beliefs themes; and the 'Reflection of effective learning' focus is defined by the Effort expenditure, Personal attributes, Differential abilities, and External influences themes. Consequently, arising from the similarities that exist, in part, between the themes, we generated five major theoretical facets for further consideration and discussion: (i) Future development and aspirations, (ii) Subject matter, (iii) Extraneous influences, (iv) Personal, and (v) Attribution and motivation.

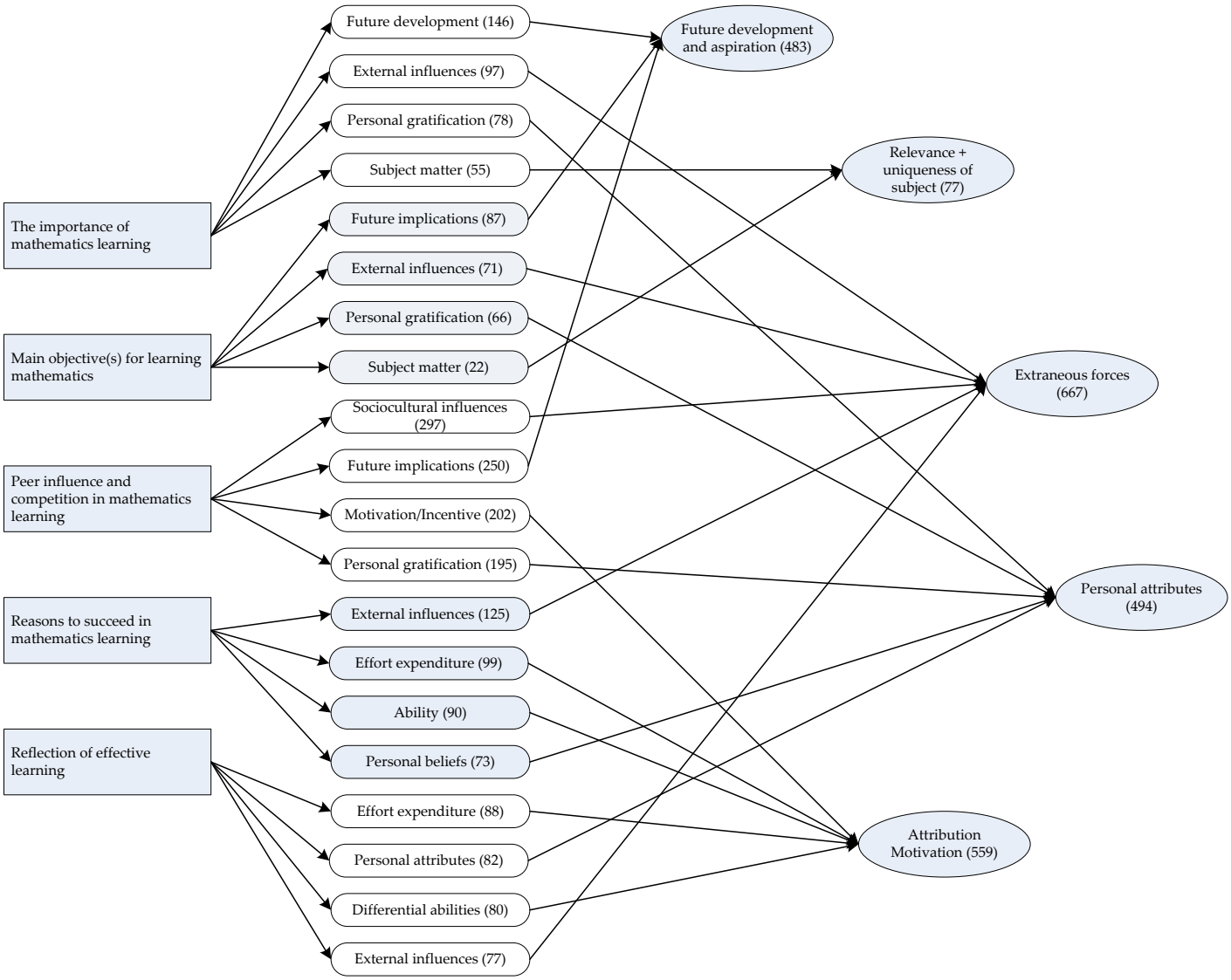

***Figure 1*: Conceptualization of findings**

An inspection of the visual mapping in total, we note the following patterns in relationships:

1. The Importance of mathematics learning → Future development → Future development and aspiration; Main objective(s) for learning mathematics → Future implications → Future development and aspirations; and Peer influence and competition in mathematics learning → Future implications → Future development and aspirations.
2. The Importance of mathematics learning → Subject matter → Relevance and uniqueness of mathematics subject; and Main objective(s) for learning mathematics → Subject matter → Relevance and uniqueness of mathematics subject.

3. The importance of mathematics learning → External influences → Extraneous forces; Main objectives → External influences → Extraneous forces; Peer influence and competition in mathematics learning → Sociocultural influences → Extraneous forces; Reasons to succeed in mathematics learning → External influences → Extraneous forces; and Reflection of effective learning → External influences → Extraneous forces.
4. The importance of mathematics learning → Personal gratification → Personal attributes; Main objective(s) for learning mathematics → Personal gratification → Personal attributes; Peer influence and competition in mathematics learning → Personal gratification → Personal attributes; Reasons to succeed in mathematics learning → Personal beliefs → Personal attributes; and Reflection of effective learning → Personal attributes → Personal attributes.
5. Peer influence and competition in mathematics learning → Motivation/Incentive → Attribution/Motivation; Reasons to succeed in mathematics learning → Effort expenditure, Ability → Attribution/Motivation; and Reflection of effective learning → Effort expenditure, Differential abilities → Attribution/Motivation.

From the summation and consolidation illustrated in Figure 1, we contend there are a number of interrelations. The Importance of mathematics learning, Main objective(s) for learning mathematics, and Peer influence and competition in mathematics learning, for example, are related by a common facet – in this case, students' future development and aspirations (21.2%[3]). The Importance of mathematics learning and the Main objective(s) for learning mathematics are related by the relevance and uniqueness of mathematics (3.4%). Extraneous forces, such as a need for affiliation and/or one's own sense of identity, in contrast, united all five foci (29.3%). Personal attributes, such as one's own satisfaction and/or gratification are, similarly, defined by the five foci established (21.7%). Finally, the Reasons to succeed in mathematics learning, Peer influence and competition in mathematics learning, and Reflection of effective learning are related by the Attribution/Motivation facet (24.5%).

[3] For this frequency count in terms of percentage, we divided 483 by 2280 (total score of responses from the five identified theoretical facets).

Discussion and Conclusions

This research investigation, differing from previous experimental and correlational studies, is quasi-qualitative in nature, involving secondary school students responding to an open-ended survey. We consider this as an ambitious undertaking, aligning closely to the theoretical tenets of achievement goals. Integral to our exploratory focus, we used the 2 × 2 achievement goals model (Elliot & McGregor, 2001; Elliot & Murayama, 2008; Elliot & Thrash, 2001) as a theoretical premise for the advancement of achievement goal orientations in a secondary school context. Our emphasis, rather than a confirmation of factor structures, is concerned with an in-depth exploration of characteristics that may define the definition (i.e., detailing the mastery-performance distinction) and valence dimensions (i.e., detailing the approach-avoidance distinction) of achievement goal orientations (Elliot & Thrash, 2001).

We used, in part, the definition and valence dimensions of achievement goals (Elliot & Thrash, 2001) to conceptualize and develop a set of open-ended questions for examination. Open-ended responses and subsequent results, by means of thematic and content analyses, provided us with fruitful information pertaining to students' insight, beliefs, and reflection about learning in mathematics settings. Furthermore our research investigation is relatively significant for its emphasis on the issue of contextualization. Similar to previous theoretical contentions and empirical research (Walker, et al., 2004), we situated students' understanding and responses of the survey within the context of mathematics learning. In this section of the article, we discuss the findings obtained with reference to the achievement goals framework. In particular, we sequence our discussion in order of the theoretical facets that we identified in Figure 1: Extraneous forces; Attribution/Motivation; Personal attributes; Future development and aspiration; and Relevance and uniqueness of mathematics subject.

Personal attributes and motivation

Arising from this research investigation is the forming of findings that emphasizes the potency of personal attributions and motivation. From Figure 1, we establish an association between two theoretical facets: personal attributes and attribution/motivation. These two facets and their association, as shown from our thematic analyses, are espoused by a few common themes, notably in this case, personal gratification, motivation, attributional beliefs, and differential abilities. Our interpretation of the findings suggests learning entails a number of purposes, such as satisfying one's own personal gratification – for example, a desire to obtain good academic grades in mathematics or a need to advance knowledge in a particular topic for

mathematics. Contentment and happiness may, for instance, serve as a focal point for individuals to persist and to expend more effort in their studies. In a similar vein, individuals' own beliefs toward learning and/or about learning also contribute to the formation of personal attributes. We all hold personal beliefs about the learning process, and what it means to aspire or acquire academic qualifications. In some cultures, as attested previously (Markus & Kitayama, 1991; Triandis, 1989; Triandis, Bontempo, Villareal, Asai, & Lucca, 1988), learning entails the notion of interdependency and beliefs pertaining to family values, dignity and pride. Academic achievement *per se* is not individualistic, but rather shared and revered by those in the immediate or extended family. In this analysis, learning is considered as not simply being about one's ability to obtain good academic grades for further study and/or individual growth. More importantly, for some collective cultures and societies, learning delivers a sense of accomplishments for respect and family honor.

We also note that apart from personal attributes, learning also entails motivation and individuals' attributions for success/failure. In this sense, our thematic analyses suggest that learning and, similarly, a need to achieve involve a myriad of influences. Notably, relating closely to personal attributes (e.g., a desire to learn for individual growth), we posit that individuals engage in mathematics learning for a number of reasons – in this case, incentives (internal/external), recognition of one's own ability, and willingness to expend effort and time in studying. The structuring of classroom settings may provide specific incentives for individuals to engage in learning. Teachers may, for example, structure their classroom walls with weekly mathematics achievement results, thus creating a sense of competition and incentive for students to achieve and excel (Urdan, 2004). In this sense, that incentives for learning may be extraneous and involve, say, rewards (e.g., prizes) or public recognition (e.g., ranking of the top 10 students for each week) for successful learning and achievement.

In a similar vein, some individuals may seek incentives from friends and capable others to engage in classroom learning – for example, recognizing that good academic grades may bring acceptance, affiliation, and a sense of sociocultural identity. We could say then, in this analysis, that academic learning is shaped internally by one's desire to fulfill personal gratification, beliefs, and satisfactions. Individuals learn because they want acceptance, or they want to experience a sense of belongingness. Peer influence may serve as a form of intrinsic motivation, wherein apart from individual competition, there is a collective feeling shared amongst individuals to assist each other in the learning process. Social interactions and

the classroom milieu may instill philosophical beliefs and ethos that actively encourage deep and mastery learning of skills and key concepts in mathematics. We may, for instance, see more input and inclination from individuals towards collaboration and non-competitive and normative evaluative actions.

According to the participants' responses, there is also recognition that differential abilities contribute to the learning processes. Relating to the achievement goals framework, it is noted that individuals differ in their abilities and these disparities, in turn, influence their approaches to learning. What we note is that capable individuals are more likely to attribute their successes in mathematics learning to effort expenditure, time management, and organization skills. Students of lower abilities, in contrast, demonstrate less motivation in mathematics learning, and attribute their failures to ineffective learning strategies (e.g., reading from a surface point of view). In a similar vein, as alluded by some participants in this study, one major difference between capable and incapable students is that the former cohort has more understanding and knowledge of reflection. In particular, with reference to students' achievements and effective learning, capable individuals show more tendencies to reflect in and on-action (Schön, 1983, 1987) their learning objectives, purposes, and achievement-related behaviors. For these individuals, academic failure or difficulties in understanding a topic (e.g., differential equations) may be attributed to a lack of effort and/or the use of ineffective learning strategies (e.g., repeated memorization). Some participants commented on using reflection as a self-regulatory strategy to 'backtrack' and amend prior mistakes, and to improve subsequent performance outcomes in learning and motivation contexts. In this sense, more knowledgeable individuals may demonstrate in-depth understanding and articulation of their own mistakes and failures (e.g., where or how the mistakes were made).

Future development, aspirations, and extraneous forces

We do know that learning, motivation, and achievement outcomes are shaped, in part, by external incentives and influences. In many cases, as alluded in cognition and motivational research, individuals learn and achieve because they want to gain more knowledge and understanding of a subject matter. By the same token, we also recognize that individuals may take value and appreciate the meaning of learning and having educational qualifications. Notably, considering the importance of professional development, we note that responses from some participants attested to their learning because of future career choices and aspirations. Reference made here, in our view, aligns closely to the emphasis on future time orientation (De

Volder & Lens, 1982; Lens, Simons, & Dewitte, 2002; Mehta, Sundberg, Rohila, & Tyler, 1972; Seijts, 1998), and how this theoretical framework explains individuals' motivation, future anticipations, and achievement-related behaviors. In this analysis, one major objective for learning mathematics and the importance of this learning is related to a perception that this subject may be prudent to one's own career choice development. For some individuals, mathematics is a subject that entails logical reasoning and serves as a prerequisite for other academic studies. We could argue, though, that mathematics is compulsory and therefore instills a deliberation in its potency as a subject. The participants, in general, showed tendencies to associate mathematics learning with future implications (e.g., considering a mathematics-related career choice). One could argue that this consideration for mathematics learning is extrinsically based and is geared towards a performance orientation – that is, "we need to achieve in mathematics because the grade we get for this subject will assist us later on".

Despite the aforementioned recognition, objectives and the importance of learning mathematics also involve personal gratification, thereby instilling a deliberation towards a mastery orientation. Comparatively, this line of evidence seems to indicate that beliefs and objectives in the learning of a subject matter, say mathematics, encompass a myriad of purposes that then deliberate different goal orientations. The emphasis on successful achievement in mathematics for future professional development, such as going to university reflects an achievement and performance orientation; for example, participants in this study mentioned their need to approach learning with a fixed mindset to ascertain good academic grades for future studies and professional development. In part, as shown from the thematic analyses, some participants also reported the influences of peers and capable others in their motives and learning (e.g., "My best friend wants to do Dentistry; I want to do the same"). Wanting to be similar to a group of friends, or the notion of competition facilitated by environmental settings both serve as incentives for individuals to persist in their learning.

In a similar vein, individuals also approach learning with personal, but contrasting purposes: for some, learning is concerned with a desire to know more about mathematics (e.g., "Differential calculus is interesting; I want to learn more about this topic"), whereas for others it is a platform to outperform and achieve public recognition (e.g., "Mr. Dutt will call out the names of the top three in this class"). It is also noted that learning associates closely with different extraneous influences, notably one of which is concerned with a need for social acceptance and affiliation. In this analysis, according to our examination, inclination towards

mathematics is shaped by personal beliefs that achievement in this subject brings forth cultural acceptance and helps create a sense of social identity (e.g., "Robin, Jean, and Daniel will like me more and will accept me their group if I do well in mathematics").

Consequently rather than clarifying or confirming the predictive contribution of, say, a performance-approach goal orientation, the evidence we obtained illuminates theoretical understanding of how and why individuals pursue their studies, short-term objectives, and/or long-term goals (e.g., "I really want to study hard and become an anthropologist later on"). This reasoning, as we have identified, may account for a secondary school student's alignment or preference towards a particular goal orientation (e.g., performance-approach). In this analysis, as we emphasize in the subsequent sections, the findings we ascertained provide theoretical insights into the effects of the 'sub-facets' (e.g., future aspiration in career development) that contribute and associate with the various achievement goal types. Significantly also, and differing from previous tenets and empirical studies (Elliot & Thrash, 2010; Harackiewicz, et al., 2002; Pintrich, Conley, & Kempler, 2003; Senko, Hulleman, & Harackiewicz, 2011), our examination reported in this study has discerned possibly the distinctive characteristics of each achievement goal orientation.

Relevance and uniqueness of subject matter

Contextualization has often been cited as making a contribution to the study of cognition and motivation. Responses from the participants emphasize, in this case, the relevance and uniqueness of mathematics in secondary schooling. In this sense, some participants noted the enjoyment of learning and achieving in mathematics simply because of its subject matter. Mathematics, as a hard pure subject (Becher, 1989, 1994), entails logical reasoning skills and, in turn, could stimulate intellectual curiosity and interest for theoretical knowledge. Some topics and themes are theoretical (e.g., Non-linear analysis) and involve effort, perseverance, and deep learning for understanding to take place. Some individuals, however, may also perceive mathematics as 'non-authentic', 'irrelevant', and 'non-applicable' to everyday living. As we noted, for a number of participants, mathematics is interesting and learning this academic subject is simply for enjoyment purposes (e.g., "Mathematics teaches me to develop new thinking skills; I really like this"), and relates very little by ways of long-term planning and/or implications. For some though, there is acknowledgment that mathematics is important, but yet elicits minimal interest and/or curiosity. There is a reflection, in part, of an avoid-

ance goal orientation, wherein participants reported their lack of initiatives to learn and achieve in mathematics for both inter and intrapersonal standards of competence.

The significance of this research investigation lies in our emphasis on the contextualized nature of a subject matter. Our initial postulation concerned the situational placement of achievement goals in the context of an academic discipline. In this sense, Becher's (1989, 1994) theoretical framework concerning the intellectual categorizations of different academic disciplines (e.g., 'hard pure' versus. 'hard applied') underpins the importance of our avocation. Similar research inquiries have been made in the area of student approaches to learning (SAL)(Murphy & Tyler, 2005), whereby it has been noted that our motives for learning are shaped by different types of disciplines (e.g., mathematics versus anthropology). Considering this notion of contextualization, we also query whether individuals' achievement goal orientations may situate and relate to subject matter. Could intellectual categorizations and their corresponding differences influence how individuals approach their learning with different motives, objectives, and goals? We reason that interesting contents (e.g., explore how submarines operate) may elicit more of a mastery-approach orientation, whereas topics and themes that send messages of importance and relevance for further implications (e.g., solve problems involving acceleration using first principles) may instill a need for a performance-approach goal orientation.

From the thematic analyses that we performed, there is evidence in part to indicate that the uniqueness of mathematics contributes to individuals' thinking, beliefs, and motives for learning. Tracing back to the refined themes that we established previously, we can say that mathematics, as a subject discipline with its own uniqueness and characteristics, influences individuals' objectives and beliefs for learning.

Consolidation and conclusion

This research investigation is relatively open for further examination into the achievement goals framework. From the outset, the methodological approach and subsequent analyses used may not necessarily address the inquiries at hand directly. Our rationale for adopting this procedure, differing from previous research studies (Elliot & Murayama, 2008; Pekrun, et al., 2009; Van Yperen, et al., 2009), concerned a need to advance and explore further the definition and valence dimensions of achievement goals (Elliot & McGregor, 2001; Elliot & Thrash, 2001). Rather than validating the factor structures of various achievement

goal orientations, we focused instead on clarifying their theoretical attributes. Notably, using thematic analyses with SPSS Text Analysis for Surveys 2.1, we extracted a number of terms and facets from participants' responses to an open-ended inventory. In turn, from extrapolation and interpretation of the results, we discussed the relevance that this study has with the 2 × 2 achievement goal model (Elliot & McGregor, 2001).

One could query the extent to which the results ascertained facilitate our understanding of the 2 × 2 achievement goal model (Elliot & McGregor, 2001). At a deeper level of interpretation, the results emphasize a number of characteristics and attributes relating to the different types of achievement goals. Although not distinctive or direct, the nature of individuals' achievement goal orientations in mathematics learning may be inferred from their beliefs about issues relating to the importance and reasons for learning mathematics. Importantly, unlike direct inference of results that can often be made with statistical techniques, the evidence we obtained requires a closer examination and interpretation. We do not discount the fact some aspects established and discussed so far require further empirical validation. Most significantly, perhaps, the evidence that we obtained illuminates in-depth qualitative facets that may account and explain the functioning and underlying mechanism of different achievement goal orientations. For example, there are behaviours that could be observed and questions asked: why does Thomas like chemistry and not geography, and under what conditions would he more likely to achieve his objectives?

In terms of relevance and importance, we identified five major theoretical facets and in their order of potency, based from frequency counts of responses: extraneous forces (e.g., a need for affiliation and/or one's own sense of identity)(29.3%); attribution/motivation facet (24.5%); personal attributes (e.g., one's own satisfaction and/or gratification)(21.7%); students' future development and aspirations (21.2%); and the relevance and uniqueness of mathematics (3.4%). If we take this content analysis into consideration, then foremost to the achievement goals framework is that orientations are very much extrinsically based. From frequency counts, individuals align closely to extraneous influences to base their beliefs and reasons for learning mathematics. We could say that, in part, learning and achievements in mathematics are performance-based orientated, wherein gearing is made towards objectives, aims, and goals that are not 'self-fulfilling' or for individual purposes. For instance, as we identified previously in our associations, individuals show tendencies to engage in effective learning for further advancement and career aspirations and development. Evidence ascer-

tained in this study also shows, but to a lesser extent, the orientation of performance objectives that result in the obtaining of good academic grades for future advanced studies and career choices.

In contrast, but with similar equal weighing, individuals' aims and objectives for learning mathematics may involve internal and self-fulfilling attributes, such as satisfying desire, interest, and intellectual curiosity to learn and know more about a subject matter. This orientation towards mastery, as reflected by personal attributes (e.g., strengthening one's own growth), is viewed as being less pivotal than a performance-based dimension. To a much lesser extent, individuals' orientation towards mastery also relates to the subject mathematics itself. We query whether other academic disciplines, such as geography or history would instill a stronger weighing in terms of interest and/or task value for learning. This possibility could be explored further with focus being situated in context settings of other academic subject disciplines. From this analysis, the importance of personal self-fulfilling attributes requires further advancement in terms of empirical validation and assessment of psychometric properties.

In essence, unlike confirmatory factor analysis (CFA), a dichotomous distinction between extraneous and internal influences is not obvious with thematic and content analyses. Apart from a percentage breakdown, and our identification of the key characteristics that define both mastery and performance goals (i.e., the definition dimension of competence), we cannot really discern other facts about the choosing or orientation of these two dimensions. In a similar vein, there is limited evidence from our examination to support or clarify the positioning of the valence dimension of competence of achievement goals. Very little information from the data is available for us to discuss or gauge into the approach and avoidance aspects of achievement goals; in this analysis, we are still perplexed as to why some individuals, for example, would focus on attaining task-based standards of competence and not on, say, a preference for superiority. We argue that the open-ended survey items used in this study were limited in terms of articulation and eliciting in-depth responses pertaining to the valence dimension of achievement goals. Having said this, we also emphasize that as a form of exploration, specific questions from the outset addressing the definition and valence dimensions may be too confined and *a priori*.

In summation, we contend the examination reported in this article has provided evidence to advance our understanding of secondary schools students' achievement goal orientations. Rather than specifying *a priori* the possible trajectories of achievement goal orientations in learning, our focus conceptualized an approach that is more exploratory in nature. We recommend researchers formulate inventories that into consideration the major facets identified (e.g., future development and aspirations) in this study. What is of interest, for example, is the quantitative validation of themes and categorizations that were ascertained previously. In a similar vein, future research investigations could also explore the developmental course of, say, future aspirations, social influences, and personal attributes and their relations with various achievement goal orientations in classroom learning.

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