Is there a generic profile of trainee primary school teachers who choose to specialise in mathematics?

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Abstract
This study is an evaluation of learning style profiles and multiple intelligence domains of level seven trainee primary school teachers who chose to specialise in mathematics at the university where the research took place. Whilst this study focusses on mathematics specialists studying at post graduate level the information could be adapted to meet the needs of other subject specialists and undergraduates, dependent on their profiles. The valuable information gathered from 53 respondents training at a university that has been at the forefront of teacher education for 130 years highlights interesting relationships between the two sets of results and analyses by both gender and the specialism route that the students opted to follow. The study offers suggestions for training establishments to consider when educating the primary school mathematics teachers of the future, potentially leading to an impact on learning outcomes and student satisfaction.

Keywords
Mathematics; learning styles; multiple intelligences; specialism; primary teaching; trainee teacher; profile.

Introduction

It is generally agreed that all learners are individuals, have distinctive differences and use various skills to learn and problem solve (McClellan and Conti, 2008; Rosewell, 2005; Silver, Strong & Perini, 1997). However, very limited research has been conducted to explore models of intelligences and learning styles that could influence attitudes towards mathematics and the choices pre-service primary school teachers have to make when selecting a specialism subject to study. Due to the limited number of previous studies, it was deemed appropriate in the literature review of this paper to engage with international studies and those pertaining to mathematics specialists whether these be secondary or primary focussed, as the pre-service teacher participants in these studies had all chosen to engage with mathematics. Additionally, it must be noted that existing research has looked solely at undergraduates whilst this study focussed on postgraduates. This project was conducted to add to the information currently available, to consider how these styles and intelligences could have an impact on the provision teacher training establishments offer and ultimately to make recommendations for future practice and further studies. The postgraduate participants were part way through their one year of study when given the opportunity to take part in the project. Some had chosen to focus on mathematics as it was a subject that interested them, whilst others were completing the mathematics specialist award route that has entrance requirements that demonstrate previous mathematics study at level 5 and above.

Review of current literature

Initially, literature was reviewed to establish how similar studies had been conducted to inform the methods for this study. It was also important to ascertain the location, scale and date of these previous studies in order to draw conclusions relevant to the university in which this research took place. After this review, Learning styles as defined by Kolb (1976) and Multiple Intelligences as described by Gardner (2011) will be set out.

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Similar studies

Perry & Ball (2004:25) highlight that a challenge for providers of initial teacher education is to ensure the curriculum is set up and delivered in a way that considers the profile of the students and gives them the opportunity to learn in 'the most favourable environment to match their style and type'. However, they also acknowledge that trainers need to take into account the support required when students are placed in situations that are related to their less preferred styles. Özgen, Tataroglu and Alkan (2011) go further explaining that by taking trainees' styles and types into account, adaptions can be made to fully support needs within the learning environment, curriculum, evaluation and assessment. In their study of 2004, Perry & Ball discuss how 336 under-graduate trainee teachers in Australia, both primary and secondary, exhibited remarkably similar profiles when assessed using three criteria: learning style, multiple intelligences and psychological type. They used this information to inform development of their under-graduate teacher training provision. Furthermore, Özgen, Tataroglu and Alkan (2011) suggest that learning providers should have a sufficient understanding of both learning styles and multiple intelligences in order to plan learning opportunities appropriately. Their study focussed on the learning styles and multiple intelligences of 243 pre- service mathematics teachers in Turkey. In addition, Katranci & Bozkus (2014) conducted a similar study in Turkey, focussing particularly on learning styles, with 155 under-graduate teacher trainees specialising in mathematics at primary level. Whilst there are some differences in the three studies, not least that they were conducted in different countries, the studies spanned a period of 9 years, and they focussed on a combination of both primary and secondary trainee teachers, there are also some parallels which should be taken into account. Irrespective of location, all studies focussed on students choosing to teach and specialise in mathematics. All three studies involved under-graduate students choosing mathematics as a specialist subject and importantly, all surveyed students using the same learning styles inventory.

Notwithstanding the fact that Perry & Ball (2004) classified all science specialists along with the mathematics specialists, their study appears to imply that, using Kolb's learning styles, explained in detail below (Kolb, 1976), students who choose to specialise in mathematics either exhibit a converging (thinking and acting) style or an accommodating (feeling and acting) style. The Turkish studies, Katranci & Bozkus (2014), Özgen, Tataroglu and Alkan (2011), agreed on the most obvious and least obvious traits being converging and accommodating respectively, however neither study agreed with the findings of Perry and Ball (2004). Interestingly these studies appear to show completely opposing findings. Perry & Ball (2004) found the most prevalent style to be accommodating whilst Katranci & Bozkus (2014), Özgen, Tataroglu and Alkan (2011) found this to be the least common. However, Scott (2010) argues that there is very little evidence to demonstrate that identifying learning styles has any effect on informing teaching practice. Koob and Funk (2002) concur with this view when discussing how the Kolb learning style inventory has been highly criticised over recent years. In addition, McClellan and Conti (2008) emphasise that tutors must provide diverse learning experiences by teaching in a variety of ways.

Interestingly there are also stark differences when comparing the results of the multiple intelligences tests. Whilst Perry & Ball (2004) found the most dominant intelligence style to be interpersonal (naturally social, friendly and out-going), the results from Özgen, Tataroglu and Alkan (2011) showed, as may be expected, a prevalence for a logical/mathematical style (think in terms of questions and concepts, test ideas). This difference could be attributed to the fact that Perry and Ball (2004) included science specialists in their sample, but it should also be noted that the two studies used different versions of the Multiple Intelligences checklist, adapted from the Gardner (1983) original. Investigating the data more closely, it can be seen that there were only two domains in which both studies agreed on mean scores in the top three styles (logical/mathematical, bodily/kinaesthetic). In addition, the research carried out in Turkey by Özgen, Tataroglu and Alkan (2011) found the lowest mean score related to the musical domain, the visual domain scoring the lowest in the Australian study. Armstrong (2009:21) highlights that Gardner himself repeatedly points out, these sorts of tests and questionnaires can only measure a fraction of the individual's whole 'spectrum of abilities'.

However, he does recognise the importance of ascertaining intelligences to pinpoint fluency and ultimately to help identify competency in each area. Adcock (2014) concurs with this view arguing that by recognising the value of multiple intelligences, educators can address the diverse ways students gain knowledge and, by teaching to these specific abilities, students will learn better. Whilst the two Turkish studies have used their findings to compare the learning styles and multiple intelligences of mathematics specialists, Perry and Ball (2014:26) suggest training providers could use the results to consider how 'classroom learning, group assignments, essay-research-writing instruction and examinations', could be adapted.

This article will examine the multiple intelligences and learning styles of post graduate students embarking on a Post Graduate Certificate of Education (PGCE) at the university where the research took place, in particular, those who chose to specialise in mathematics. The results will be compared to the previously mentioned studies to look for commonalities and differences, particularly in respect to the fact that these students are undertaking a post graduate degree whereas the aforementioned studies all looked at students who were mid undergraduate course. The results from these findings would be of interest to any teacher training provider irrespective of the country or region in which they are located.

Learning Styles

Learning styles were defined by Kolb (1976) as the way an individual prefers to gather information. In 1976 he developed a Learning Styles Inventory (LSI) and he concluded that for effective learning to take place an individual requires ability in the following four areas:

- Concrete Experience/ Pragmatist (CE) – being fully involved in new experiences.
- Reflective Observation/ Reflector (RO) – reviewing and reflecting on these experiences from a variety of perspectives.
- Abstract Conceptualization/ Theorist (AC) – being able to create sound theories and concepts from their observations and reflections.
- Active Experimentation/ Activist (AE) – making decisions and solving problems by using these theories.

The categorisation of a particular learning style is then determined by analysing preferences for these abilities on two learning continuums, firstly a location between AE and RO and secondly the location between AC and CE. The combinations of the preference for one learning ability over another providing the classification of one of four learning styles. The characteristics of each learning style can be exemplified by relating them to everyday situations and ideas:

- Those who tend towards RO over AE and to CE over AC are classified as Divergers. They are imaginative and can view concrete ideas from many perspectives, they like to gather information, work in groups and receive personalised feedback.
- Assimilators tend towards RO rather than AE and AC rather than CE, learning by a combination of reflection and conceptualisation, they can put together information into a logical and concise format, they prefer reading and having time to think things through rather than being focussed on people.
- Contrastingly, those preferring an Accommodator style have CE and AE as dominant abilities. These students are considered risk takers and problem solvers and learn by hands on experiences, they can often act on gut feelings rather than logical data and evidence.
- Finally, Convergers have dominant abilities in AC and AE. They prefer things to people and learn by experimenting with new ideas, solving problems and putting their solutions to practical use. (Peker and Mirasyedioglu, 2008, Kolb and Kolb, 2005, Koob and Funk, 2002).

Multiple Intelligences

Howard Gardner proposes that everyone has many intelligences, challenging the long – held beliefs about intelligences and the limited view that this is often linked to either linguistic or mathematical

prowess, such as the Intelligence Quotient (IQ) test. He therefore introduced his theory of multiple intelligences in 1983 and has continued to update his theories. He originally proposed seven intelligences, which has, since his original work, increased to nine. Briefly these intelligences can be described as follows:

- Verbal/ Linguistic – mastery of written and spoken language.
- Logical/ Mathematical – understanding number, logical thinking and effective reasoning skills.
- Visual/ Spatial – ability to create a mental image to assess and problem solve.
- Interpersonal – recognising and understanding the moods and emotions of others.
- Intrapersonal – knowing oneself.
- Musical – ability to compose and perform in a variety of musical forms.
- Bodily/ Kinaesthetic – linking mental ability to physical movements.
- Naturalist – ability to appreciate and make connections to things found in nature.
- Existential – appreciation of human existence.

The questionnaire used in this study was based on Gardner's original model but was developed before the inclusion of the existential intelligence. The use of such instruments can provide educational establishments with information to help them develop curriculum content and learning experiences for students (McClellan and Conti, 2008, Perry and Ball, 2004). However, it is interesting to note that Gardner (1999, cited in Perry and Ball, 2004) insists that learning styles are not the same as intelligence, hence the use of both instruments for this study (see table 1).

Table 1. Taken from Özgen et al. (2011:171) – the differences between Multiple Intelligences and Learning Styles [sic].

Multiple Intelligences	Learning Style
It focuses on what an individual can learn (product)	It focusses on how an individual can learn (process)
It suggests changing education by drawing upon students' abilities.	It suggests changing education by drawing upon students' learning styles.
It argues that some students learn intuitively.	It argues that some students are intuitive, while others are not, and that they need structure and supervision.
Multiple Intelligences proponents advocate making changes in the methodology used in the classroom, but most emphasise using students' talents in the same way, at the same time, and in the same amount of time.	They argue for the need to exploit different educational resources in harmony with the [sic] students with different learning styles learn best.
It is not different for kinaesthetic and tactile students.	It differs for kinaesthetic and tactile students, arguing for a different teaching for them.
There is limited empirical research.	There are researches based on strong evidence.

Methodology

Measures

The measures used to collect data for this project were Honey and Mumford's Learning Style Questionnaire (LSQ) which is adapted from Kolb's Learning Styles Inventory (KLSI) using styles closely linked to those defined by Kolb, and a Multiple Intelligences Type (MIT) questionnaire based on Howard Gardner's Multiple Intelligences model. Each was specifically selected due to the researcher's ability to be able to access editable versions of the questionnaires that students could complete either electronically or as a hard copy. These measures were chosen as they are both accepted as appropriate measures and are considered valid and reliable as they have been used in several other studies

collecting data from similar sources (Katranci & Bozkus, 2014, Özgen, Tataroglu and Alkan, 2011, Perry & Ball, 2004). The KLSI consists of 80 statements to which the respondent chooses to either agree or disagree. The MIT is broken down into 8 sub sections, each corresponding to a multiple intelligence type, the section titles were redacted to ensure no sub conscious bias was employed. Each sub section contains 10 statements which the respondent marks if they feel the statement pertains to them. Participants were invited to take part and assured all university ethical guidelines and those of the British Education Research Association (BERA, 2011) would be adhered to. All responses were stored in encrypted files, participant consent forms were destroyed and anonymity was assured due to respondents only being asked to disclose their gender and chosen route of study.

Participants

The research was undertaken to develop an understanding of the profiles of teacher trainees who choose to specialise in mathematics when they enrol on a PGCE programme at the research university in the North West of England. All 53 eligible students were invited during seminar sessions to complete two short questionnaires, a learning styles inventory and a multiple intelligences test. Of the respondents 34 (64.2%) are female and 19 (35.8%) are male, this reflects the current trend for more females to enrol on primary initial teacher training courses at this university. There were 24 students (45%) enrolled on the mathematics specialist route, a one - year course which has entrance requirements of a degree in a mathematics related subject and an A/A* in GCSE mathematics, ensuring the participants have a mathematically skilled background. This route also provides a Government funded bursary to those achieving A at A level. In addition, 29 (55%) chose to follow the mathematics specialism route, open to all PGCE students with an interest in mathematics. Both routes follow the same teaching, learning and assessment approaches, the major difference being that the specialists attend five extra conference days focussing in much greater depth on the history of mathematics, international perspectives and classroom practice.

Findings

All analyses were carried out using the Statistical Package for the Social Sciences (SPSS).

Learning Styles

Table 2. Mean scores on the Learning Style inventory (rounded to 2 d.p.).

Learning Style Inventory n=53	Activist	Reflector	Theorist	Pragmatist
Mean (Each learning style can score a maximum of 20 points)	8.47	14.32	12.51	12.17
Standard deviation	3.24	3.74	3.17	3.41
Female mean	7.85	14.91	12.56	11.88
Male mean	9.58	13.26	12.42	12.68
Specialist mean	8.71	14.33	12.50	12.33
Specialism mean	8.28	14.31	12.52	12.03
Minimum (out of 20)	1	5	4	4
Maximum (out of 20)	15	20	20	20

Analysis of the Learning styles inventory indicated the highest overall mean score to be in the reflector dimension, which was replicated with the mean scores connected to the mathematics route followed and gender distribution (Table 2.). All groups concurred with the lowest mean score being for the activist dimension.

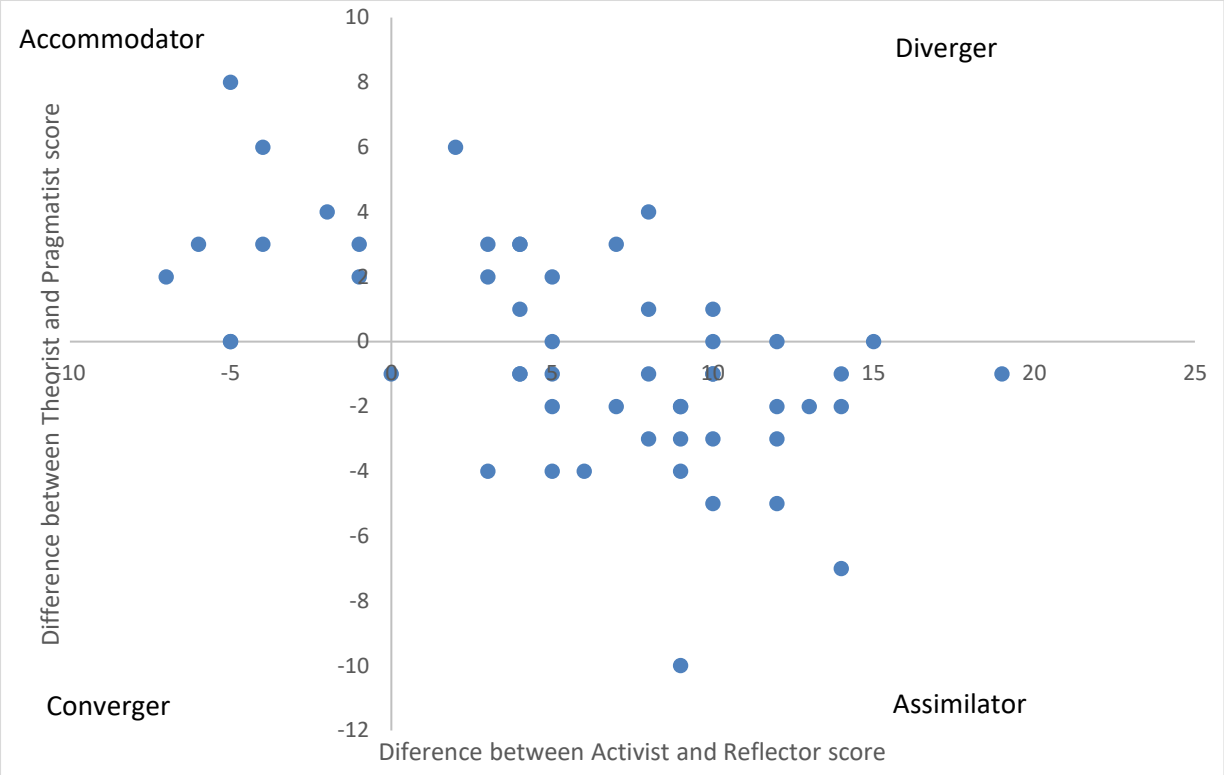

Figure 1. Distribution of the trainee teachers according to Learning Style.

According to Kolb (2005), a person's learning style is made up of a combination of the four dimensions mentioned above and placed on the co-ordinate grid (Figure 1) by calculating the difference between the activist and reflector scores (x axis) and the pragmatist and theorist scores (y axis).
Overall, it can be seen from figure 1 that the predominant learning style is assimilator (58%), this predominant style is replicated when analysing the route followed and gender. However, it is interesting to note that the gender analysis indicates, whilst female respondents are predominantly assimilators (62%), the predominance for male respondents to this style is lower (53%) (Figure 2). This difference can also be noted with the route followed where specialism students favour the assimilator style more than the specialist students (62% against 54%).

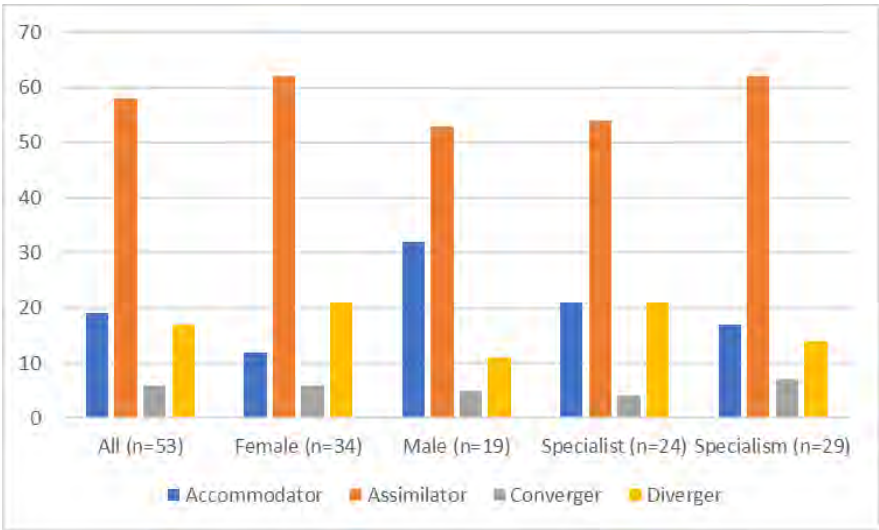

Figure 2. Distribution by percentage of each Learning Style.

Multiple Intelligences

Figure 3. Distribution by percentage of each Multiple Intelligence domain (Updated).

The data pertaining to trainee teachers' multiple intelligences was obtained by looking at their maximum score on the questionnaire. As may have been expected the highest proportion of students favoured the logical/ mathematical domain, with none scoring highest in either the musical or the bodily/kinaesthetic domains (Figure 3). This trend is continued when looking at gender, however 42% of males scored highest in the logical/ mathematical domain compared to only 35% of females. It is interesting to note that almost half of the male respondents (47%) had no predominant intelligence style when looking at highest scores whereas only 26% of females demonstrated no particular trait. The data related to route followed appears to clarify that to enter as a specialist, trainees must have a maths related degree as 42% favour a logical/ mathematical intelligence style, whereas only 34% of the students who chose the specialism route favoured this domain. Gardner (2011) advocates that his multiple intelligences celebrate the differences between all students and therefore everyone will

possess a mixture of abilities and skills, explaining why some results were inconclusive to one intelligence.

Table 3. Distribution of integrated Learning Styles and Multiple Intelligences by route and gender. (Empty set multiple intelligences are not included).

n=53		Specialism		Specialist	
Learning style	Multiple intelligence	Female	Male	Female	Male
Accommodator	Logical/ Mathematical	2	0	0	2
	No predominant style	1	2	1	2
Assimilator	Interpersonal	2	0	2	0
	Intrapersonal	0	1	1	0
	Logical/ Mathematical	4	1	2	4
	Naturalist	0	1	0	0
	Verbal/ Linguistic	3	0	0	0
	Visual/ Spatial	0	0	1	0
	No predominant style	5	1	1	2
Converger	Logical/ Mathematical	1	0	1	0
	No predominant style	0	1	0	0
Diverger	Interpersonal	0	0	1	0
	Intrapersonal	1	0	1	0
	Logical/ Mathematical	1	1	1	1
	Verbal/ Linguistic	0	0	1	0
	No predominant style	1	0	0	0

Breaking the data down even further by combining both sets of results (Table 3), it can be seen that students demonstrating a preference for a multiple intelligence domain mainly displayed an assimilator (42%) learning style, with little difference shown between routes of study although there are greater variations in female traits than male.

Discussion

The results from the recent study show that over half (58.5%) identify with an assimilating learning style, demonstrating an affinity with putting information into a logical and understandable format. This is in stark contrast to the results of the Perry and Ball (2004) study where only 11.6% of respondents identified with this style (Table 4). Interestingly, this was the highest percentage of respondents for one style in any of the four studies mentioned within this report. Even comparing the two solely primary mathematics studies does not illicit any obvious comparisons. The Katranci and Bozkus (2014) research found the predominant style to be converging (preferring to experiment with new ideas) (52.9%) whereas this was the least prevalent in the current study (5.7%). Furthermore, neither the predominant nor least dominant style in the UK study corresponded with any of those in the other three studies (Table 4.).

Table 4. Comparison of study results (Learning Styles).

% Preferring each Kolb's Learning Style	**Perry & Ball (Science/ Mathematics) Primary & Secondary**		**Katranci & Bozkus (Mathematics) Primary**		**Özgen, Tataroglu &Alkan (Mathematics) Secondary**		**Hooton (Mathematics) Primary**	
	%	*	%	*	%	*	%	*
Accommodating	44.2	1	5.8	4	11.5	4	18.9	2
Assimilating	11.6	4	9.7	3	35.4	2	58.5	1
Converging	24.4	2	52.9	1	39.5	1	5.7	4
Diverging	19.8	3	31.6	2	13.6	3	17.0	3

***Ranking**

Whilst it is not possible to compare mean scores for the Multiple Intelligences tests because different questionnaires were used, the ranking of the intelligences does warrant comparison. Both studies that were solely focused on mathematics (Özgen, Tataroglu & Alkan, 2011 and Hooton, 2019) concluded that mathematics specialists predominantly exhibited a logical/ mathematical intelligence, in addition, each study established that the least dominant intelligence was musical. However, the Özgen, Tataroglu and Alkan (2011) research was carried out amongst secondary school trainee teachers whereas the current study only looked at primary trainees although the results from both would suggest there is a common intelligence for mathematics specialists. The Perry & Ball (2004) findings may be explained by the inclusion of science specialists, as their principal intelligence is interpersonal, with logical/ mathematical ranking third (Table 5).

Table 5. Comparison of study results (Multiple Intelligences). Whilst the mean scores cannot be compared due to the fact different questionnaires were used, the order of highest to least mean score does have a relevance.

Mean scores	**Perry & Ball (Science/ Mathematics) Primary & Secondary**		**Özgen, Tataroglu &Alkan (Mathematics) Secondary**		**Hooton (Mathematics) Primary**	
	Mean scores	**Ranking**	**Mean scores**	**Ranking**	**Mean scores**	**Ranking**
Linguistic	17.17	6	20.34	6	5.00	3
Logical/ Mathematical	19.12	3	28.23	1	6.75	1
Spatial	16.35	7	24.89	2	3.96	6
Musical	18.50	5	20.05	7	3.92	7
Bodily/ Kinaesthetic	20.66	2	24.63	3	4.21	5
Interpersonal	22.12	1	24.12	4	5.40	2
Intrapersonal	19.12	3	23.72	5	4.66	4
Naturalist					3.79	8

This recent study has analysed results in greater depth than the previous studies by taking into account gender and the mathematics route followed. It can be seen that irrespective of gender over half of participants identified as assimilators, (male 53%, female 62%). This trend is also repeated whether the student had undergraduate qualifications in a mathematics related subject or not, (specialist route 54%, specialism route 62%). Common trends are repeated with both genders and mathematics route

when analysing multiple intelligences. Where a preference was identified the logical/ mathematical style dominated (male 42%, female 35%) (specialist route 42%, specialism route 38%). The strengths of people exhibiting this style can be described, unsurprisingly as 'an enjoyment of ordering, categorising, calculating, experimenting, stating hypotheses and inferring consequences' (Perry and Ball, 2004).

It is interesting to note the similarities and differences within these groups relating to learning styles. Whilst the prevalent learning style for each gender was assimilator and the least prevalent was converger (5%, 6%), double the number of males than females tended towards an accommodator style (learning from hands on experiences) (32%, 12%) whereas double the number of female demonstrated a diverging style (imaginative and good at generating ideas) (21%, 11%) The most and least prevalent styles are replicated when considering the mathematics route followed, but with less stark differences between the numbers exhibiting accommodating and diverging styles.

The multiple intelligences data could be said to prove less conclusive. The females who completed the questionnaires exhibited in total five different prevalent intelligences with one quarter not favouring any specific intelligence. This figure was remarkably different for males with only three different prevailing results, and almost half the males favouring no specific intelligence (47%). Even the intelligences that were favoured were different with males only scoring in the intrapersonal and naturalist domains, whereas females ranked amongst the interpersonal, intrapersonal, visual and verbal criteria.

Whilst it might be assumed, and in this study proven, that students following a mathematics route into teaching would demonstrate an affinity with the logical/mathematical intelligence, many other traits were also highlighted. Some specialist and specialism mathematicians demonstrated predominant traits within the interpersonal, intrapersonal, verbal and visual domains whilst 29% and 38% of respondents respectively demonstrated no predominant intelligence at all. Due to the relatively small sample size, it could be argued that the results from this study are inconclusive when drilling down into the specific genders and routes, however some conclusions can be drawn when looking at the data as a whole. It can be seen that 21% of respondents exhibit assimilator styles combined with logical/mathematical traits. When taking into account those with no predominant intelligence domain, this increases to 38%. (Table 6).

Table 6. Distribution by of integrated Learning Styles and Multiple Intelligences.

N=53	**Multiple Intelligence**								
Learning Style		Verbal/ Linguistic	Logical/ Mathematical	Visual/ Spatial	Inter-personal	Intra personal	Naturalist	No predominant intelligence	Total
	Accommodator		4					6	10
	Assimilator	3	11	1	4	2	1	9	31
	Converger		2					1	3
	Diverger	1	4		1	2		1	9
	Total	4	21	1	5	4	1	17	53

Conclusions and Suggestions

With the predominance of preferences for assimilating and logical/mathematical styles, it is suggested that these traits should be considered when planning, teaching and assessing trainee teachers specialising in mathematics. Consideration should be given to assessments being submitted where results could be presented as tables and charts. Assimilators' strengths lie with carrying out research and organising their notes rather than the actual writing and presentation, so supporting them in these areas could be key. Where examinations are part of the course assessment, assimilators depend on being able to anticipate a regular format to the test, therefore educators should ensure that exam

formats are clarified with students as soon as possible to allow them time to plan ahead. Additionally, assimilators are more successful with a multiple-choice format than essay style questions as the matching and true and false style questions offer the opportunity to use their logical thinking and relate answers to known facts and theories (Terry, 2001).

Within lectures, seminars and tutorials the mathematical/ logical learners will benefit from concise information presented as tables, graphs and charts rather than a full narrative. Assimilators prefer lecture style learning environments to classroom situations and require the information to be clearly explained. Whilst not favouring group learning situations and student led presentations it should be noted that assimilators will benefit from working alongside others whose strengths lie in planning, writing and presenting. As such, group style assessments could benefit every learner (Terry, 2001).

Peker and Mirasyedioglu (2008) are keen to point out that ultimately teacher educators are responsible for the learning environment and teaching styles and approaches used within training establishments. In addition, Perry and Ball (2004) and Terry (2001) emphasise that when delivering lectures and seminars, attention should be paid to every preference group ensuring activities are diverse enough for each group to thrive in an environment that matches their style. However, it is of equal importance to equip teachers with exceptional skills, knowledge, and abilities by immersing them in situations and presenting them with challenges that pertain to the other styles and intelligences (Özgen, Tataroglu and Alkan, 2011, Perry and Ball, 2004). Nonetheless, whilst being careful not to 'pigeonhole learners into rigid style categories' (Terry, 2001), some adaptations could be made specifically for maths specialist with the potential to impact on learners' performance and results and ultimately their overall satisfaction with the course.

Whilst this study has collected data from students opting to focus on mathematics, similar studies could also be conducted to address the learning needs of students choosing to specialise in other curriculum subjects to specialise in. Consequently, a project to review the impact of changes to provision would be of interest after an initial period of time to embed the changes.

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