

Gender differences in the level of engagement with mathematics support in higher education in Ireland

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Large scale multi-institutional survey on Mathematics Learning Support (MLS)

- ✧ 2009/2010: Creation and pilot of survey
- ✧ Feb 2011: Dissemination of survey
 - Emailed to rep in each HEI; hand out; return to committee; analysis handled by committee
- ✧ 2011/2012: Data entry and analysis
 - SPSS; Grounded Theory used for qualitative data
- ✧ 2013: Report synthesis

Large scale multi-institutional survey on Mathematics Learning Support (MLS)

✦ 9 HEIs took part

- 5 universities, 4 institutes of technology (IoTs)
- Uni: DCU, NUIG, NUIM, UCD, UL
- IOT: Blanchardstown, Carlow, Tallaght, Tralee

✦ 1633 first years completed questionnaires

- 1629 indicated gender

Methodology

- ✧ Evaluation of students' opinions on MLS
 - Establish evidence for best practice in MLS on institutional, national, international bases
- ✧ **Pilot questionnaire** created (based on existing surveys), distributed and reviewed in 2009-10
- ✧ Finalized survey sent to those in MLS in HEIs
 - There are 7 unis and 13 IOTs in Ireland
- ✧ Questionnaires returned from 9 HEIs (5 & 4)
 - Distributed in 2nd semester (2010-11) to 1st year service-maths students

Questionnaire

- ✧ Anonymous
- ✧ Paper-based
- ✧ 17 questions in total
 - Variety of
 - Multiple-choice
 - Five-point Likert-scale
 - Open-ended questions

Questionnaire - 3 sections

Section A: (Everyone)

- Gather information regarding the respondents' background

Section B (Users of MLS)

- Ascertain satisfaction levels with services provided
- Investigate perception of impact of MLS on their mathematics education

Section C: (Non-users of MLS)

- Investigate reasons why students did not engage with MLS
- What might encourage them to use MLS

Why look at gender and MLS?

- Gender not an original focus of study...
- ...But respondents were
 - 57.6% male
 - 42.4% female...
- ...And MLS was used by
 - 29.5% of males
 - 45.1% of females
 - 35.9% of respondents overall

Initial thoughts

- Maybe this is not statistically significant?
- It appears to be...
 - p-value < 0.001 (chi-squared=41.884, 1df)

Initial thoughts

- Maybe the females MLS users have weaker mathematical backgrounds?
- Gender and LC mathematics level independent (p-value = 0.415)
- Gender and LC mathematics grade at each level significantly linked (p-value < 0.001)
 - Twice as many males as females: A-grade at Higher Level
 - 14% males, 22% females: A-grade at Ordinary Level
 - Reflects national trend that year

Usage of MLS by gender and LC mathematics grade

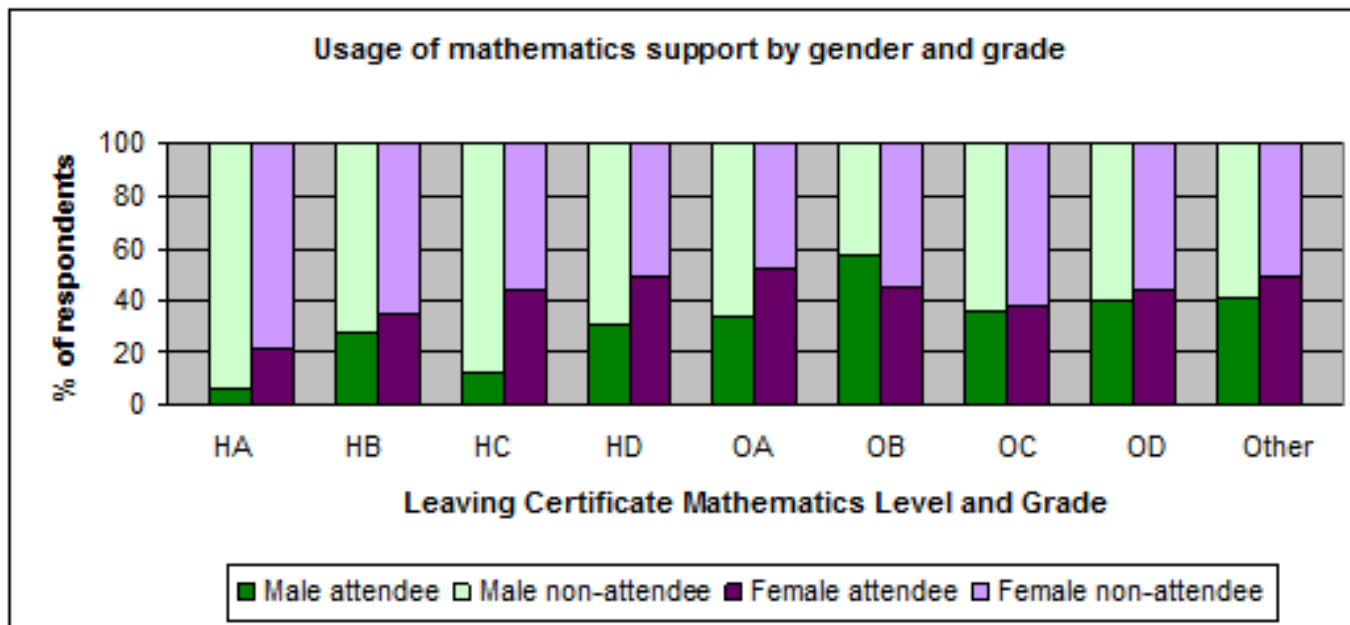


Figure 1. Percentage of students of each gender and Leaving Certificate mathematics grade who used mathematics support. Note that HA stands for an A-grade at Higher Level, while an OA stands for an A-grade at Ordinary Level, and so on.

Research questions

- 1) Is there a significant difference between male and female students' level of engagement with MLS?
- 2) Do male and female students report different reasons for using/not using MLS?
- 3) Do male and female students report a differing impact upon themselves as a result of using MLS?
- 4) Are there differences in the responses given by non-users of MLS when asked what might encourage them to engage with MLS if needed?

Gender and Discipline of Study

- Significant association between gender and discipline ($p\text{-value} < 0.001$)
 - Particularly in Engineering and Computing
 - 87% and 83% male in our sample
 - 85% and 78% male nationally
- Education less biased than nationally
 - Only post-primary teachers in sample

Gender and Discipline of Study

	Science	Engineering	Business	Arts	Education	Computing	Total
Male	50%	87%	50%	42%	36%	83%	58%
Female	50%	13%	50%	58%	64%	17%	42%
Total	579	235	483	67	89	171	1624

Usage of MLS by gender and discipline

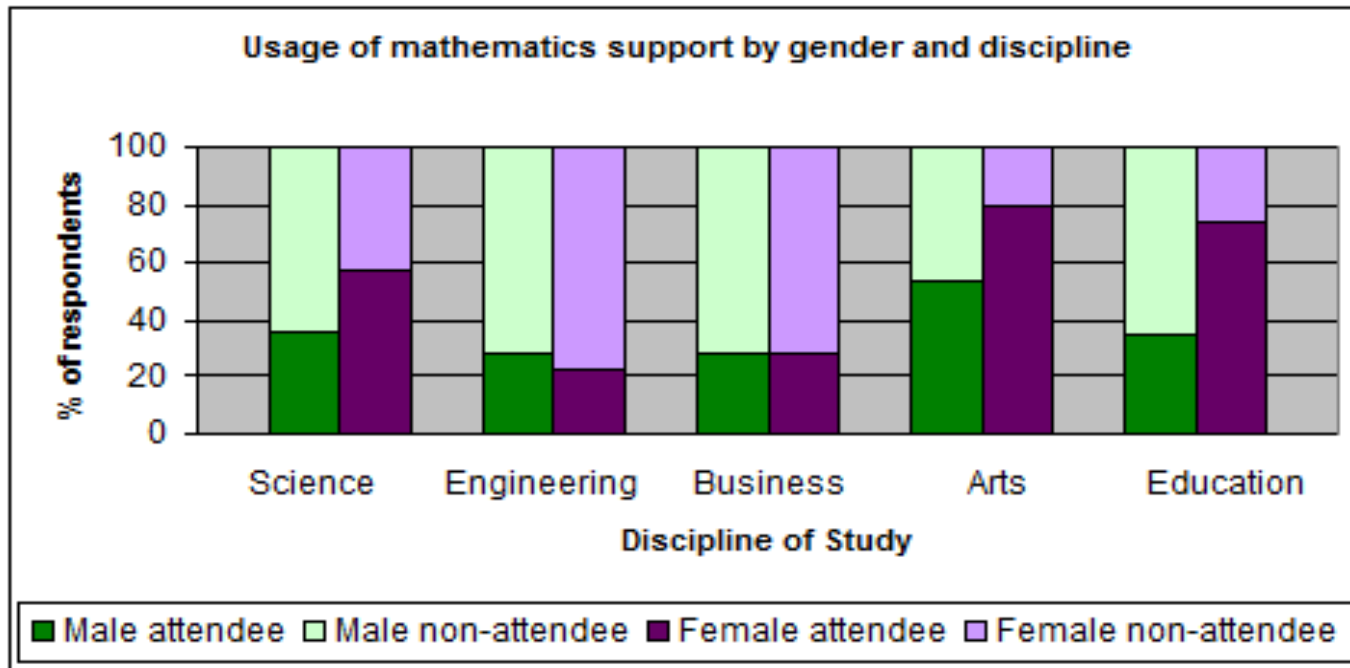


Figure 2: Percentage of students from each discipline who used mathematics support, given as a proportion of students of each gender in the discipline within our study.

Usage of MLS by gender and discipline

- Higher usage of MLS by females than males in similar disciplines
- Higher usage of MLS by females than males with equal or lower levels of prior mathematical attainment
- **Differing levels of engagement with MLS by gender**
- Any evidence as to why in their comments?

Reasons for using MLS by gender

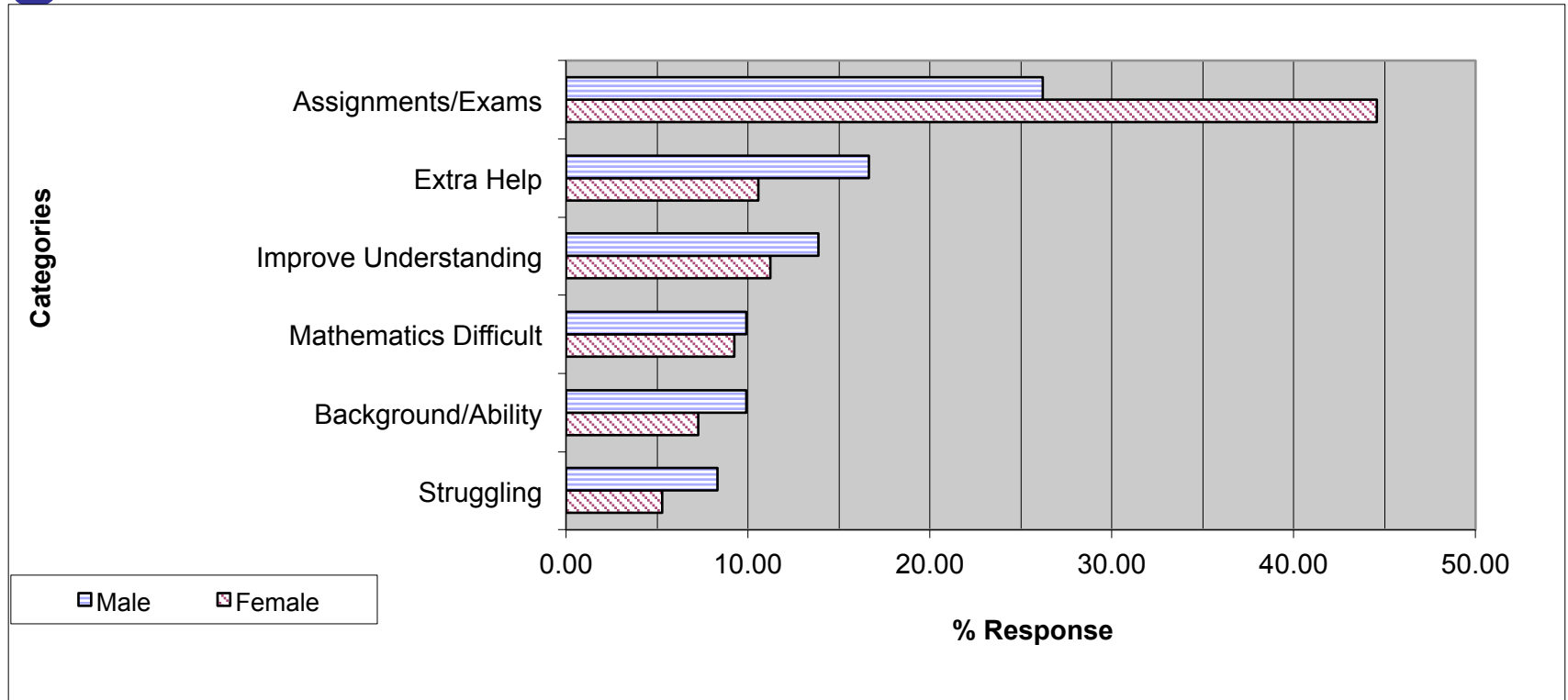


Figure 3. Percentage of students of each gender whose answers to the question “Why did you first decide to use mathematics support?” fell into each of the six main themes identified (males $n = 252$, females $n = 303$).

Reasons for using MLS by gender

- Assignment/Exam:
 - 26% of males, 45% of females
- Extra help: (17% M, 11% F)
- Understanding (14% M, 11% F)
- Difficulty of maths (10% M, 9% F)
- Background/Ability (10% M, 7% F)
- Struggling (8% M, 5% F)

How has MLS helped you to cope with mathematical demands of your course?

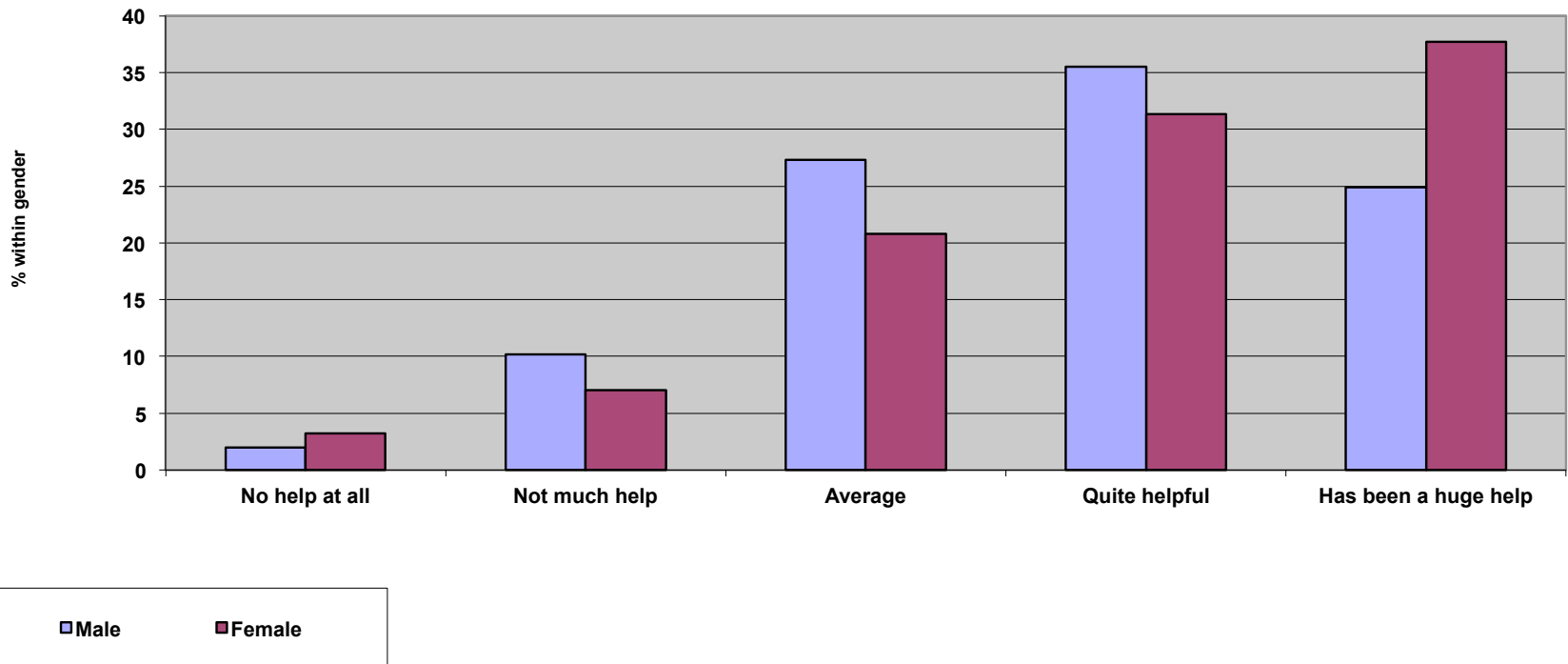


Figure 4: Student ratings by gender in response to the question “Rate how mathematics support has helped you to cope with the mathematical demands of your course”.

How has MLS helped you to cope with mathematical demands of your course?

- Significant difference based on gender
 - (p-value=0.017)
- All other “impact” questions independent of gender
 - Considered dropping out of course due to maths difficulties
 - MLS improved confidence
 - MLS impacted performance in exams
- **Students of both genders report equal benefits from MLS usage**

Non-Users of MLS

- Asked for reasons for non-usage
- List of reasons given (based on answers to pilot)
- Students could choose more than one option

Reasons for not using MLS

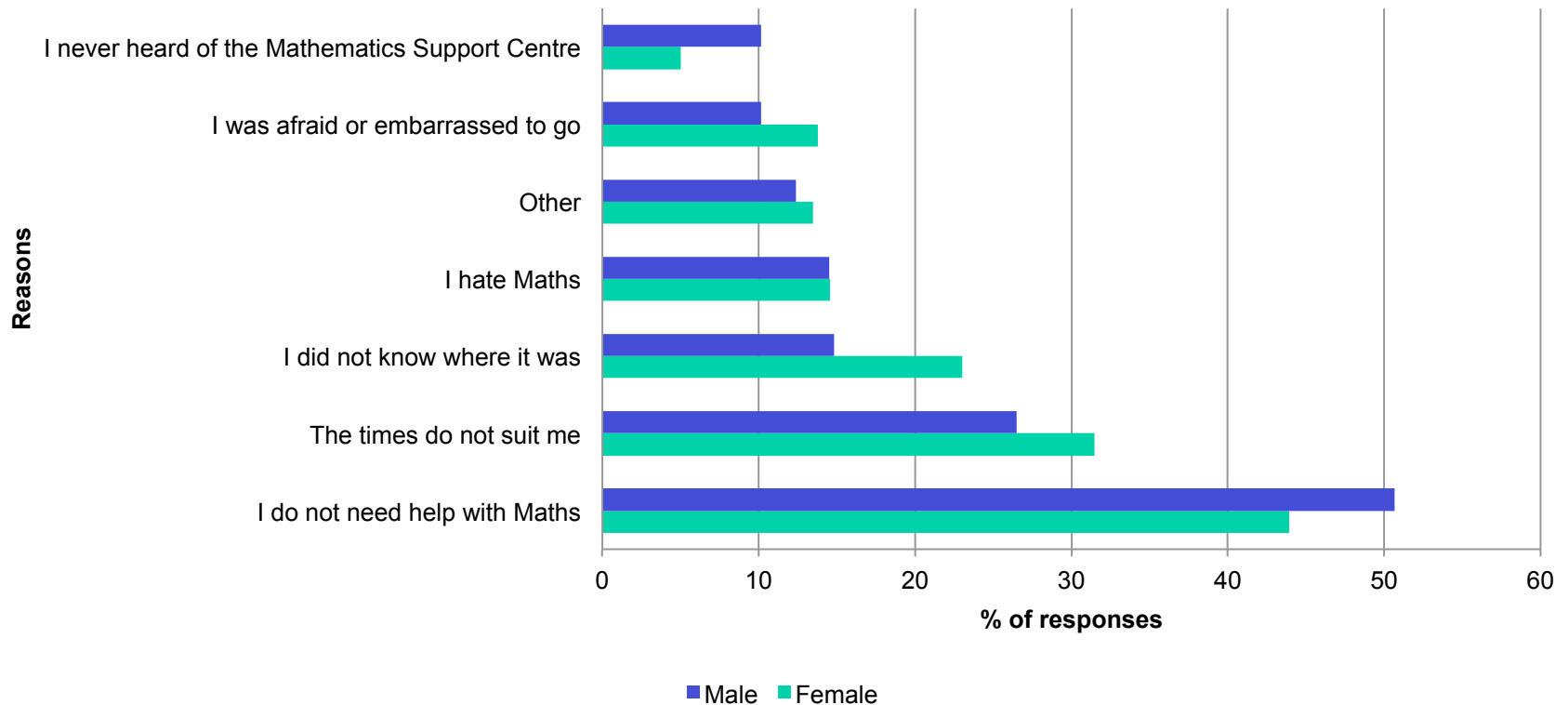


Figure 5. Percentage of respondents of each gender who chose each of the above reasons in answer to the question “If you did not use mathematics support, why not?” (males $n = 652$, females $n = 373$).

Reasons for not using MLS

- No help needed (51% of males; 44% of females)
- Times do not suit (26% M; 32% F)
- **Did not know where it was (15% M; 23% F)**
- Hate maths (15% M; 15% F)
- Embarrassed/Afraid to go (10% M; 14% F)
- **Never heard of MLS (10% M; 5% F)**

- **Some differing reasons reported by gender**

What would encourage you to use MLS if you needed to?

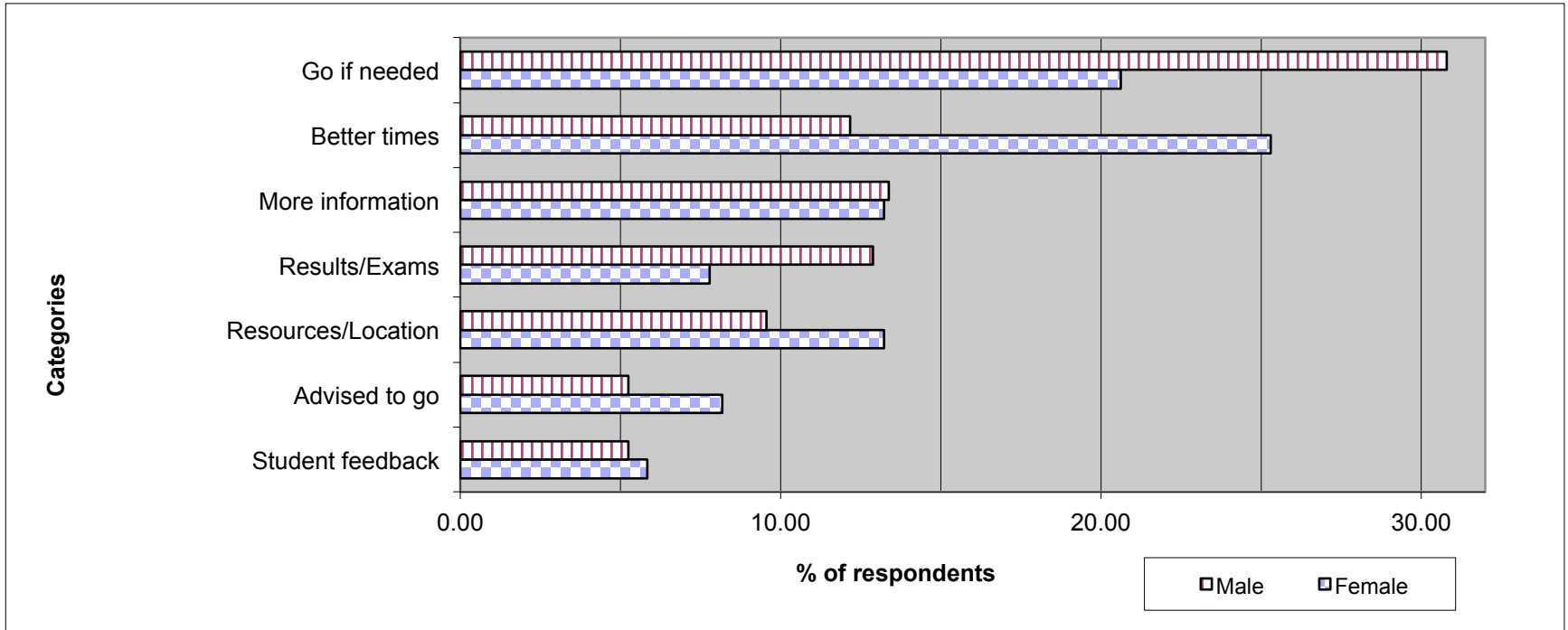


Figure 6. Percentage of respondents of each gender whose responses fell under each of the main themes listed above when asked “What would encourage you to use mathematics support if you needed to?” (males n = 419, females n = 257).

What would encourage you to use MLS if you needed to?

- **Go if needed (31% of males, 21% of females)**
- **Better times (12% M; 25% F)**
- More information (13% M; 13% F)
- Results/exams (13% M; 8% F)
- Resources/Location (9% M; 13% F)
- Advised to go (5% M; 8% F)
- Student feedback (5% M; 5% F)
- **Difference in reasons given by gender**
 - (p-value < 0.001)

Conclusions

- Female students engaging in greater numbers
 - Unclear exactly why
- Students report no difference in impact of MLS once they attend
- No clear suggestions emerged from male non-users of MLS as to what would encourage attendance
- Further research needed in this area to ensure optimal provision of MLS for all

Go raibh maith agaibh (thank you)

- ✦ Analysis and write-up of full report just completed
 - Full details to be published in coming months
- ✦ Any questions?