Free/Libre/Open Source Software for developing countries: skills, employment and costs

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Software in society

"Access [to ICTs] is not enough, it is the ability to create, to add value, that is important"

Felipe Gonzalez

former Spanish Prime Minister,

Speaking at Open Source conference in Málaga, Spain, 18/2/04

Costs, skills and economic growth

- Costs
  Windows Office, US$560, is 2.3 months of average income in Brazil, equivalent to US$ 6777 in the US. Cost does matter.
- Skills development: "the ability to create"
  FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer
- Economic growth: "ability to add value"
  FLOSS allows local entrepreneurs to provide a greater share of total value added, thus retaining a greater share of profits within the local economy

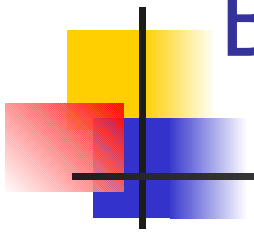
FLOSS develops local skills

- Not skills to use FLOSS applications, but skills learned from participating in the FLOSS community
- Skills learnt through participating in the FLOSS community:
  - programming
  - copyright law and licenses
  - teamwork and team management

FLOSS develops local skills

- FLOSS encourages not only passive "use" but active participation in the creative process
- FLOSS provides a very low barrier to entry for creativity – you don't have to be creative but if you want to, you easily can

But do we all want to program?



- How will we know, unless we can try?
- HTML is a programming language – the web only took off because it was open, so people could learn to write their own sites just by copying and changing other sites
- "Programming" covers a very broad range of skills from HTML to C; FLOSS allows entry at any degree with little investment in time or effort

Skills and economic growth

- Skills development: "the ability to create"
  FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer
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Local value addition: proprietary

- Building over a platform
  This applies equally to any platform, which is simply used as a (non-modifiable) base on which new services or software are built: 100% of the added value is local
- Sales commissions
  Something which is rarely possible with free software, but also represents little value. Only the commission is retained locally, which is a small part of the total value.
- Support, integration, customisation...
  Local value addition limited, as “deep” (high-value) services require “deep” access – only the proprietor has it.

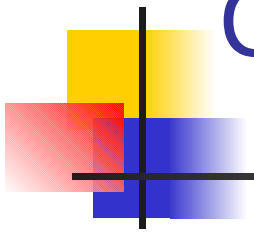
Local value addition: FLOSS

- Building over a platform
  As with proprietary software, free software platforms can be used as a (modifiable!) base on which new services or software are built: 100% of the added value is local
- Sales commissions
  Rarely possible with free software, but also represents little value. However, the entire "sale price" can be retained locally, as no proprietor has to be paid a royalty or licence.
- Support, integration, customisation...
  Local value addition extensive, as "deep" access is available. 100% of such services can be provided locally, retaining 100% of the value locally.

The importance of customisation...

- Custom or in-house software represents about 67% of total software produced (in the US; more elsewhere)
- If based on free software, custom solutions greatly benefit the solutions provider who captures 100% of the total value, not just the value added locally – no royalties/licences paid

Code re-use, higher service levels



- Free software allows providers to reuse code rather than build from scratch, and to reuse a huge base of code written by others
- Re-using (and modifying) allows the creation of much better end-user solutions for the same effort than writing from scratch
- Put together, this provides better value for money for customers and better profit margins for local service providers

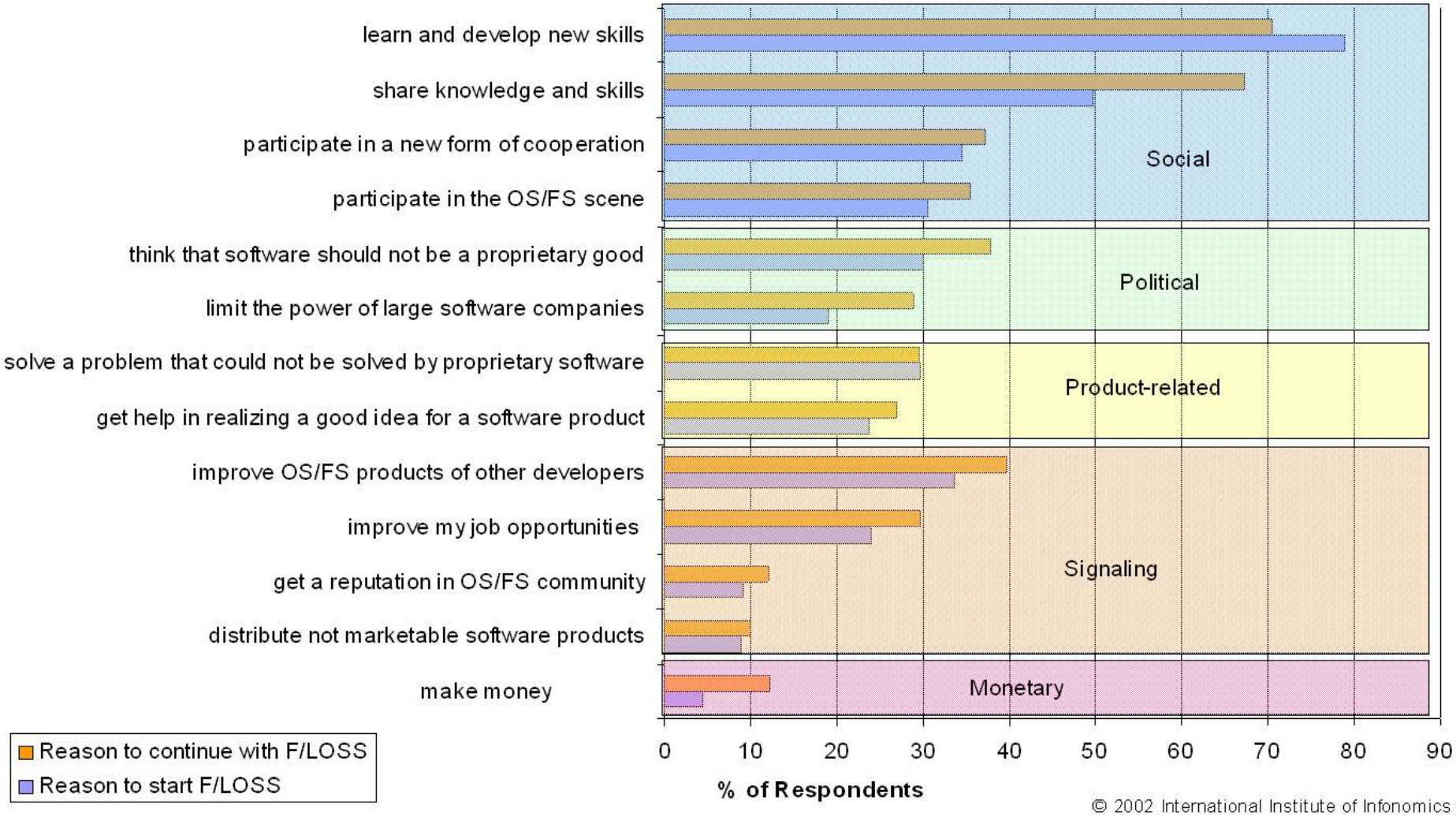
“Deep” support, more local value

- Local companies are limited in the integration and support services they can provide for proprietary software
- Deep support: fixing software bugs, customising it to user requirements, or integrating extensively with other software requires deep access.

“Deep” support, more local value

- Deep access to proprietary software is controlled by the proprietor (limits access or requires royalties, diminishing value retained locally)
- Deep access to free software is available to anyone – limited only by their skills. This allows every provider to potentially provide deep support services, and retain 100% of the value.

Why develop FLOSS?



(Source: "FLOSS Final report", Ghosh et al)

FLOSSPOLS Skills Survey

- How is learning organised in the FLOSS community?
- What mechanisms and patterns can be observed?
- For which purposes do community members learn?
- What is the impact of skills learnt on employment potential?

FLOSSPOLS Skills Survey

- Aim: to study both skills learnt and impact on employability.
- Separate questionnaires sent to:
  - developers (worldwide)
  - employers (EU)

Hypotheses

- Technical skills
  - New participants should learn various skills
  - Experienced participants should learn too
- Management skills
  - New and experienced participants should learn teamwork, coordination and management skills

Hypotheses

- Legal skills
  - Participants should learn legal skills, more than in formal (non-legal) courses
- General skills
  - Non-English speakers improve their English

Hypotheses: formal learning

In comparison with formal ICT courses:

- FLOSS provides a better, practical learning environment for many technical skills:
  - Writing re-usable code & debugging
  - Working with code written by others
- FLOSS provides a better learning environment for most legal and teamwork skills, which are rarely taught in formal ICT courses

Hypotheses: learning methods

- Formalised knowledge transfer would be less common than self-organised knowledge absorption, even where the knowledge is codified rather than tacit
- Methods of "learning by doing" would be seen as more useful for technical skills development than formal training
- (There is no uniform "learning strategy" for skills improvement within the community, even for those with the same level of prior knowledge)

Other hypotheses

- Self-organized informal learning in Internet communities is not purely work- and career-related, the FLOSS community bears the potential to play a vital role for democracy and social inclusion in the emerging knowledge society

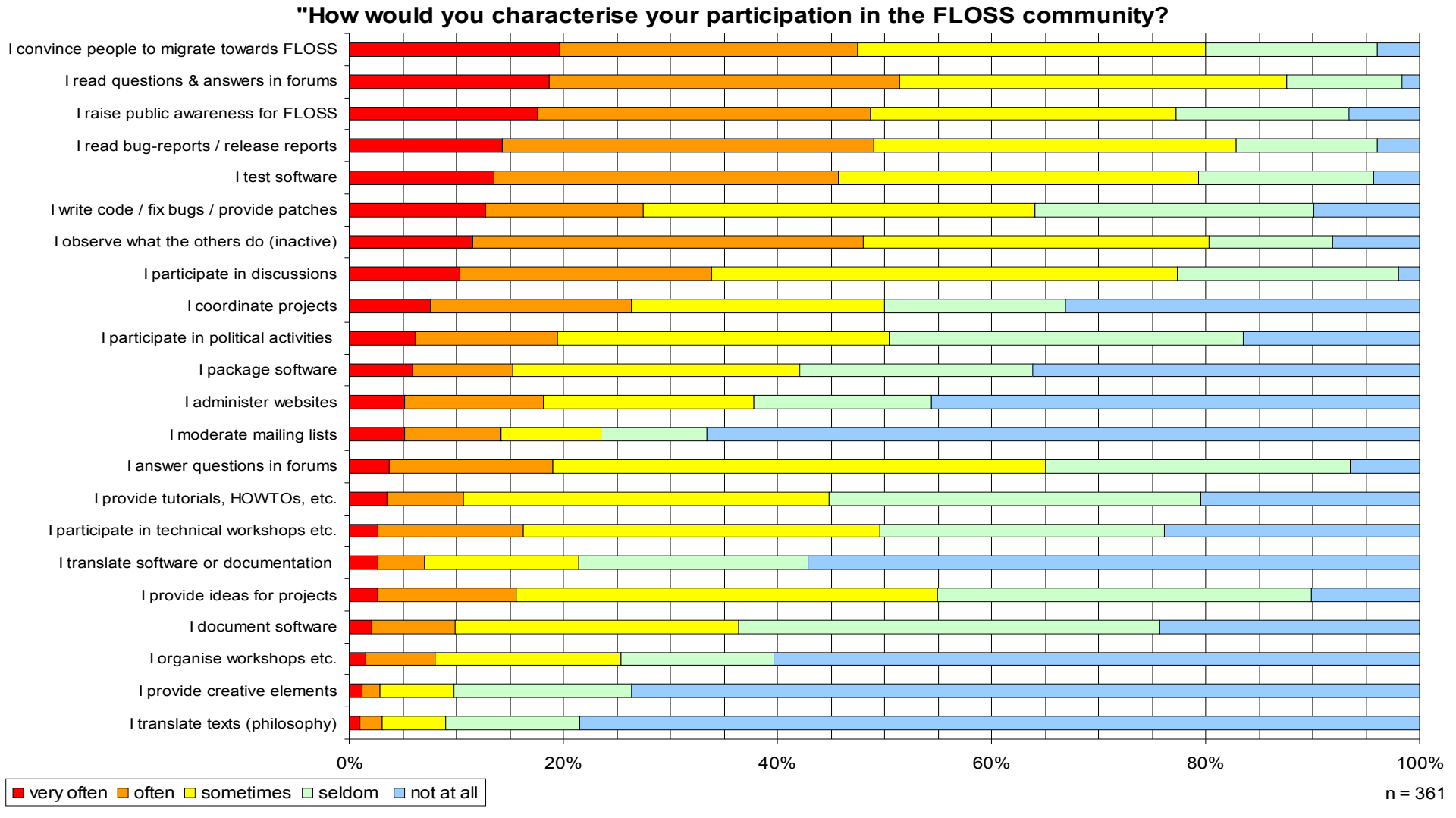
Methodology

- Personalised survey: Based on FLOSS Developer Survey 2002, addressing 1449 of the more than 2800 respondents
- Response: 361 respondents from 1151 valid addresses (31%)
- Additional 1091 respondents from an open online survey (not personalised, on slashdot etc, results not used today)
- Employer survey on value of FLOSS-skills for firms in different industries (software, business services, finance)
  - UK, France, Germany, Spain
  - 147 responses so far (of which 128 are used here)

Developers: demographics

- 8.7 years of FLOSS participation
- 31 years old
- All earn direct or indirect FLOSS income
- 68% employed, 13% students, 15% self-empl.
- 75% hold a university degree

Findings: types of participation

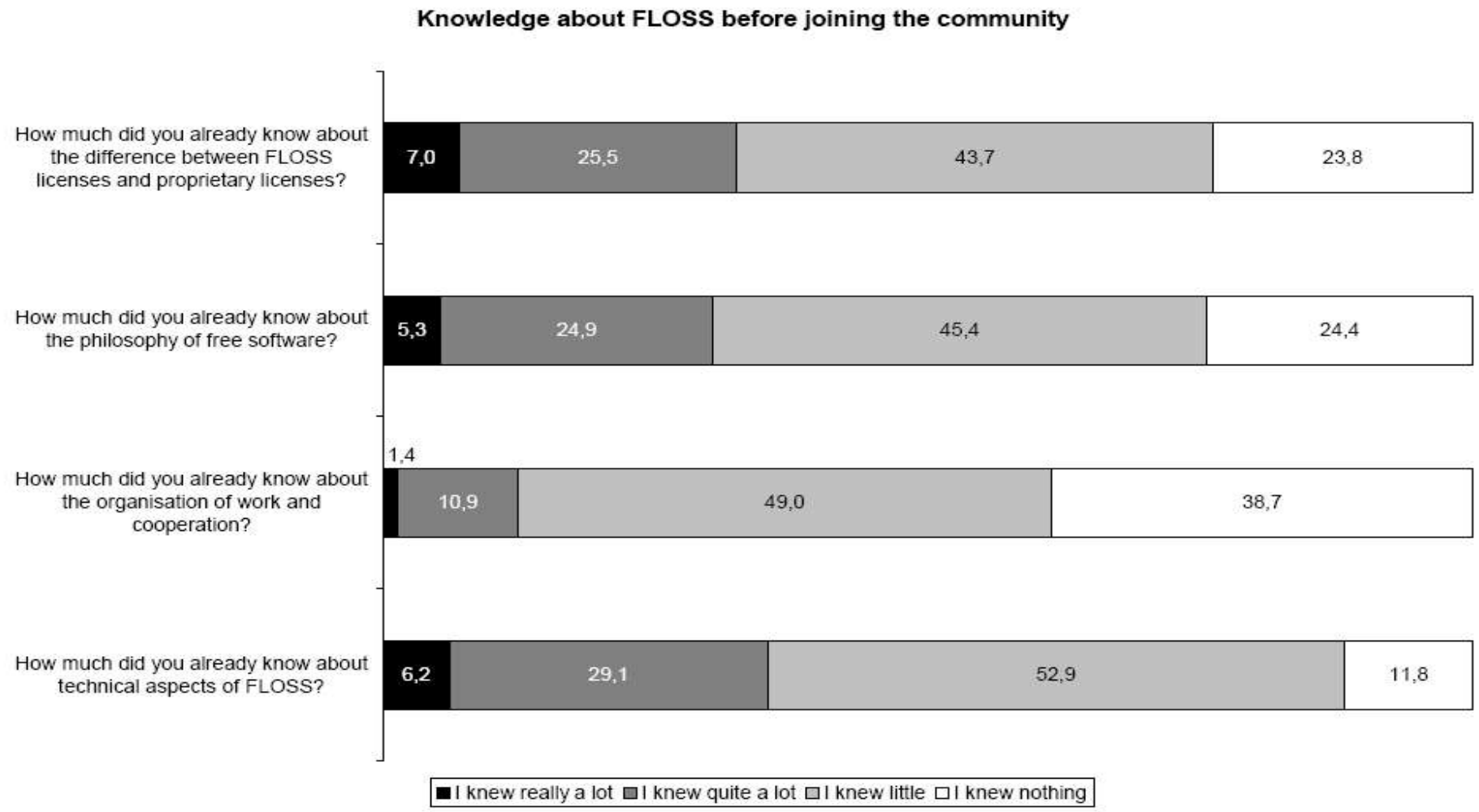


Findings: types of participation

Principal component analysis shows 6 activities:

- Organisational (workshops, websites, projects)
- Bugfixing / coding / testing activities
- Political activities (convincing others)
- Translation
- Communication (discussion, online forums)
- Support (graphics, documentation, tutorials)

Prior knowledge



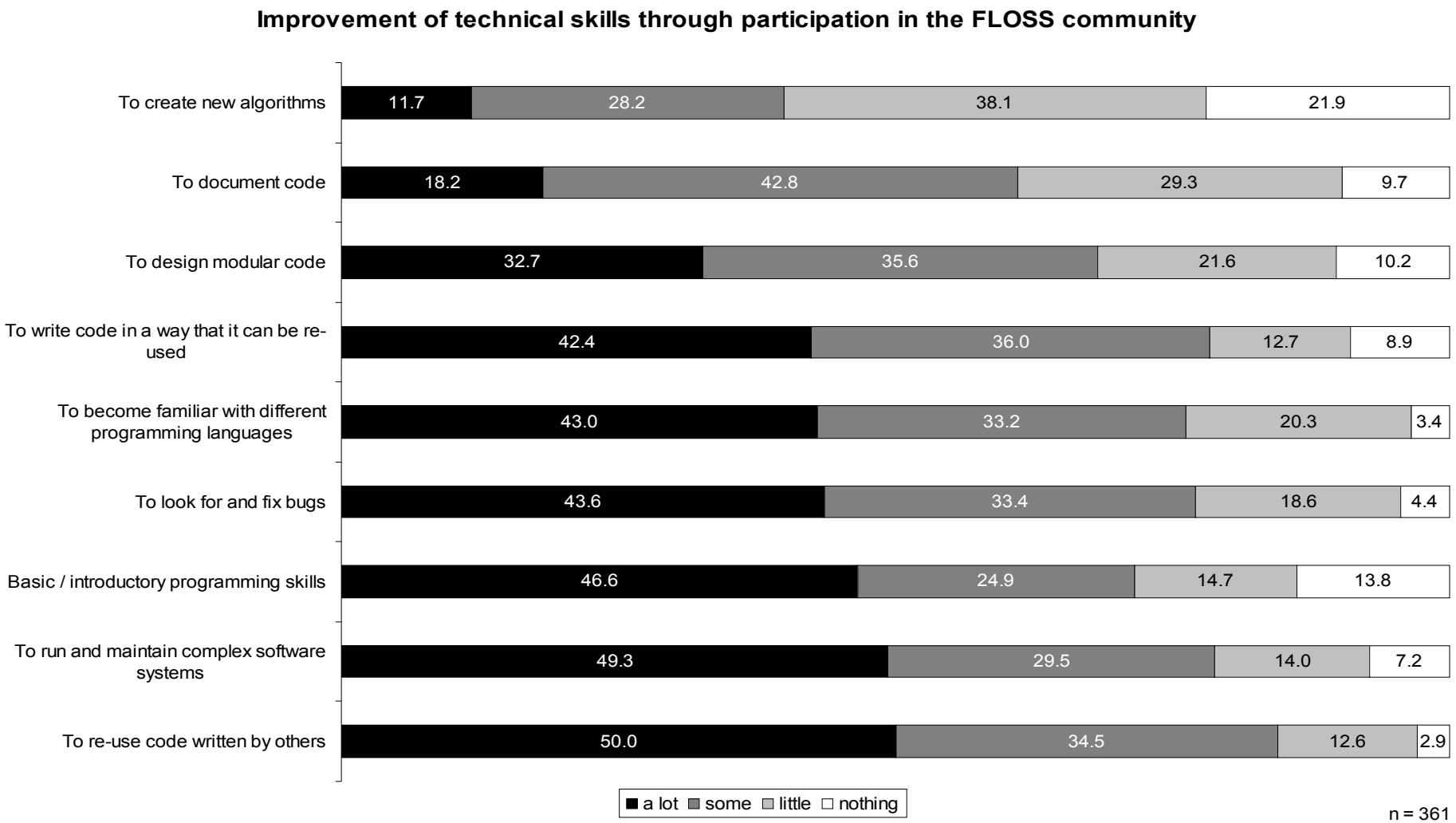
Prior knowledge and skills learnt

- Those with a lot of prior technical knowledge:
  - Less likely to learn English "a lot" (35%) than those without prior knowledge (47%)
  - Less likely to learn Basic programming "a lot" (34%) than those without (54%)
  - More likely to learn familiarity with progr. langs. "a lot" (49%) than those without (40%)

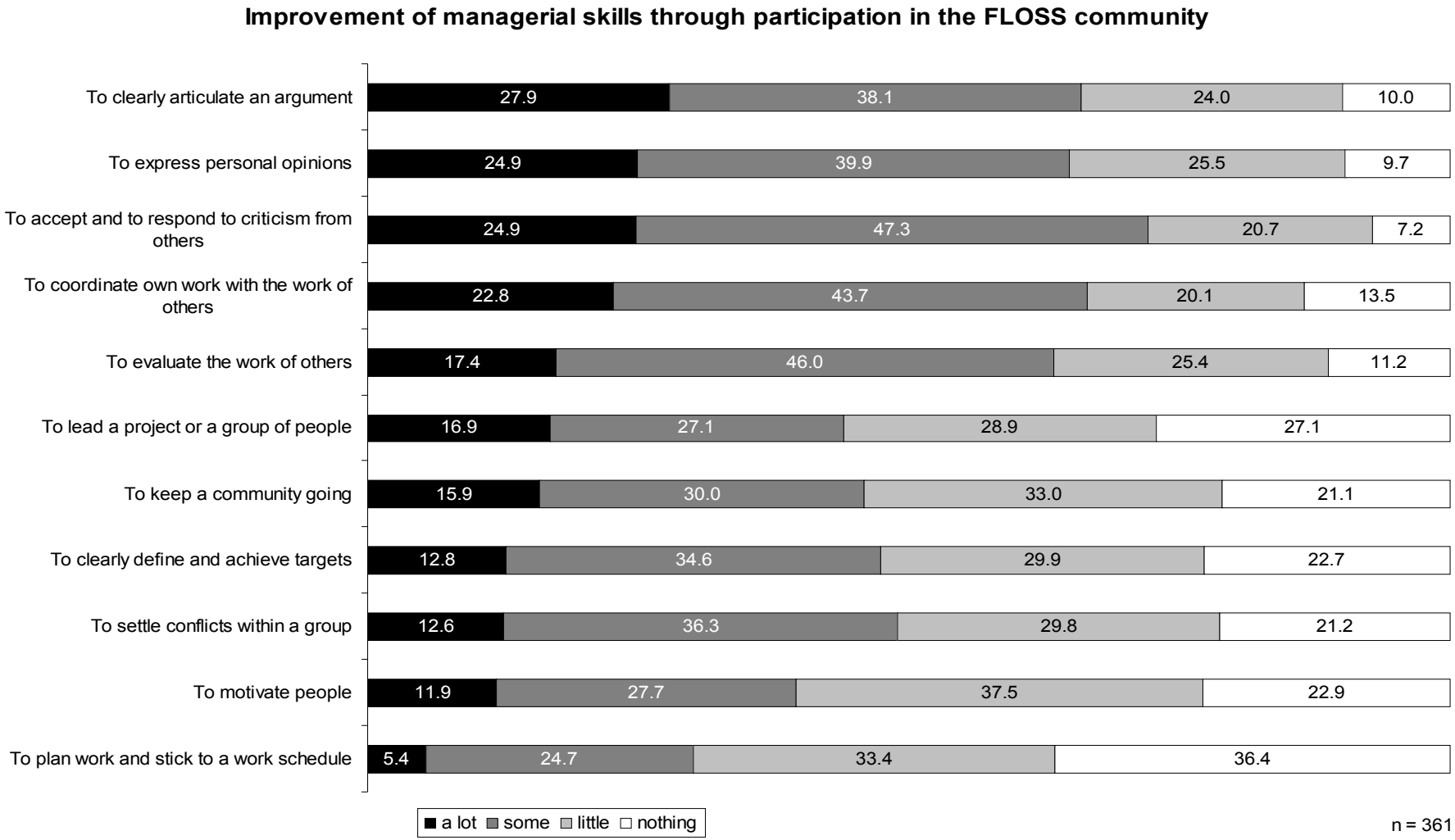
Prior knowledge and skills learnt

- Those with a lot of prior knowledge on how "work and cooperation in FLOSS is organised":
  - More likely to learn how to keep a community going (35%) than those without (13%)
  - More likely to learn to motivate others (27%) than those without (10%)
  - More likely to learn planning and scheduling (13%) than those without (5%)
  - More likely to learn to achieve/define targets (24%) than those without (12%)

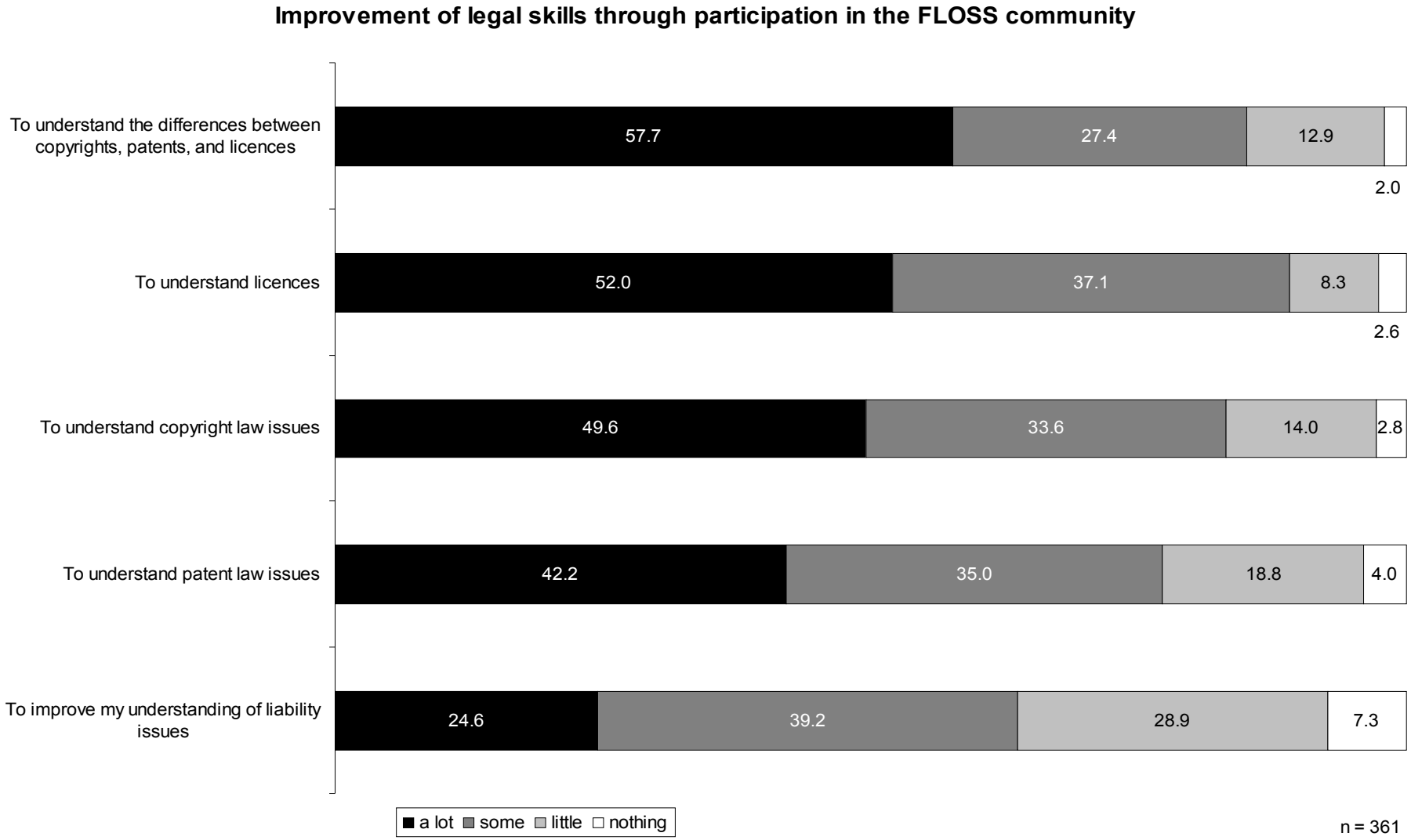
Skills learnt: technical



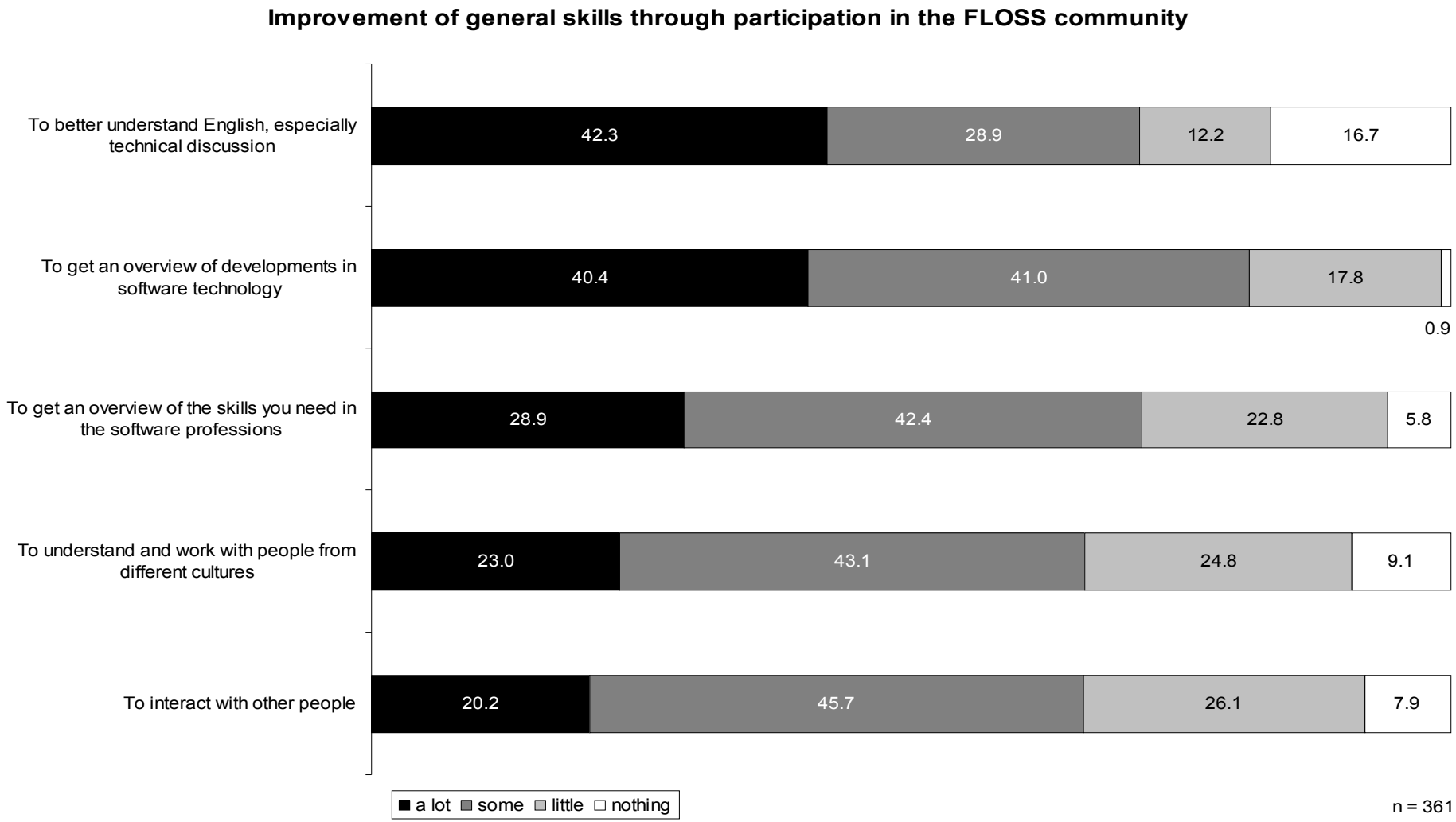
Skills learnt: management



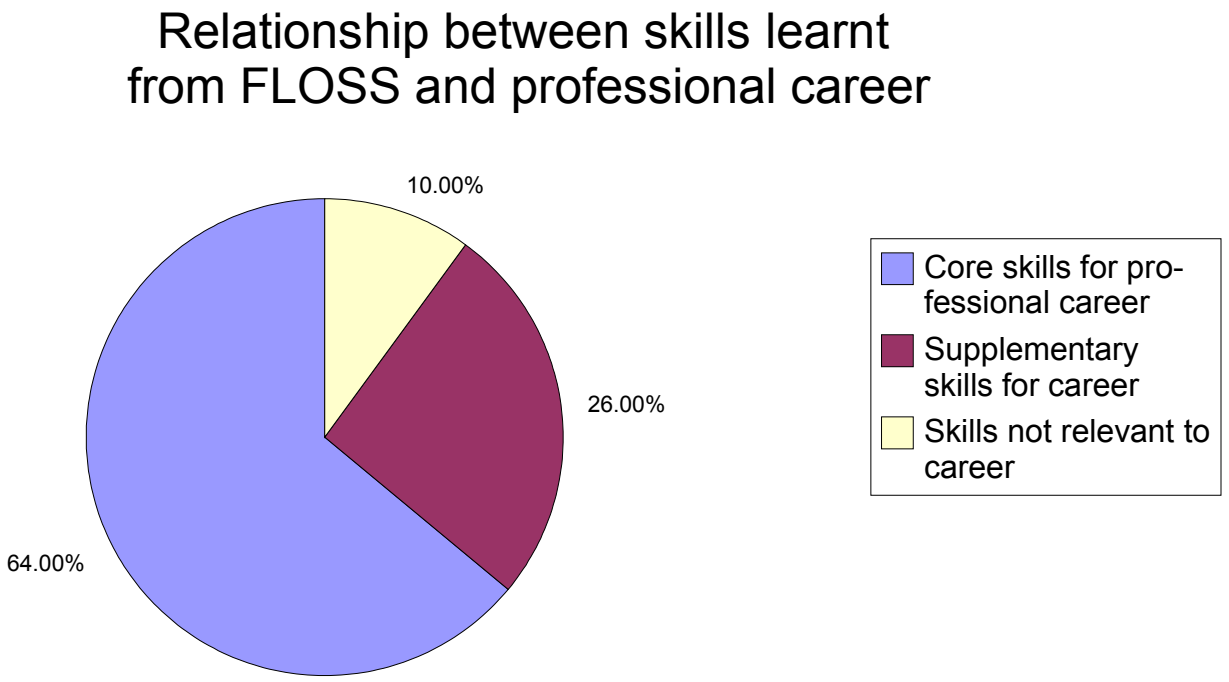
Skills learnt: legal



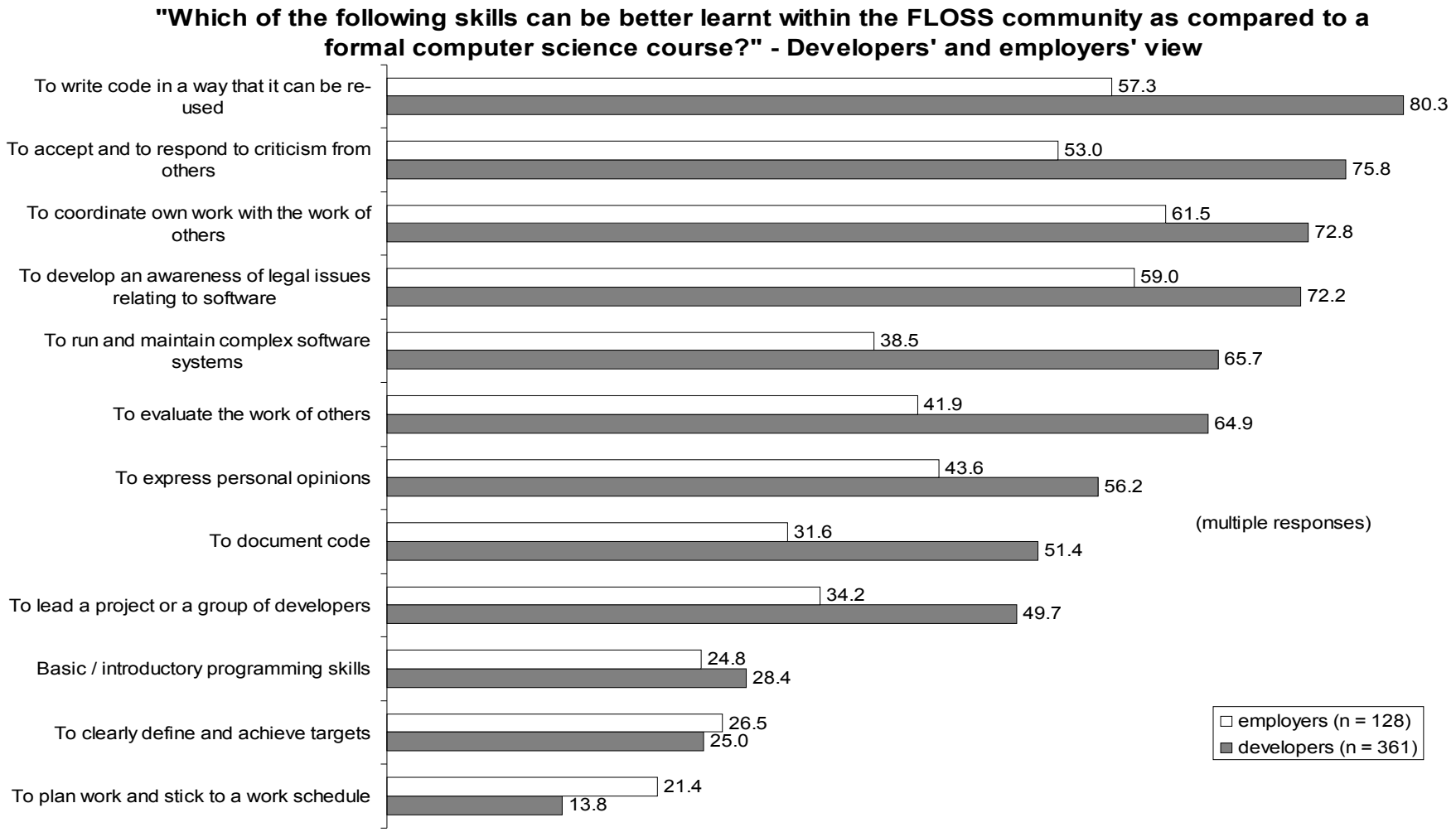
Skills learnt: general



Importance of skills learnt



Learning compared to formal course



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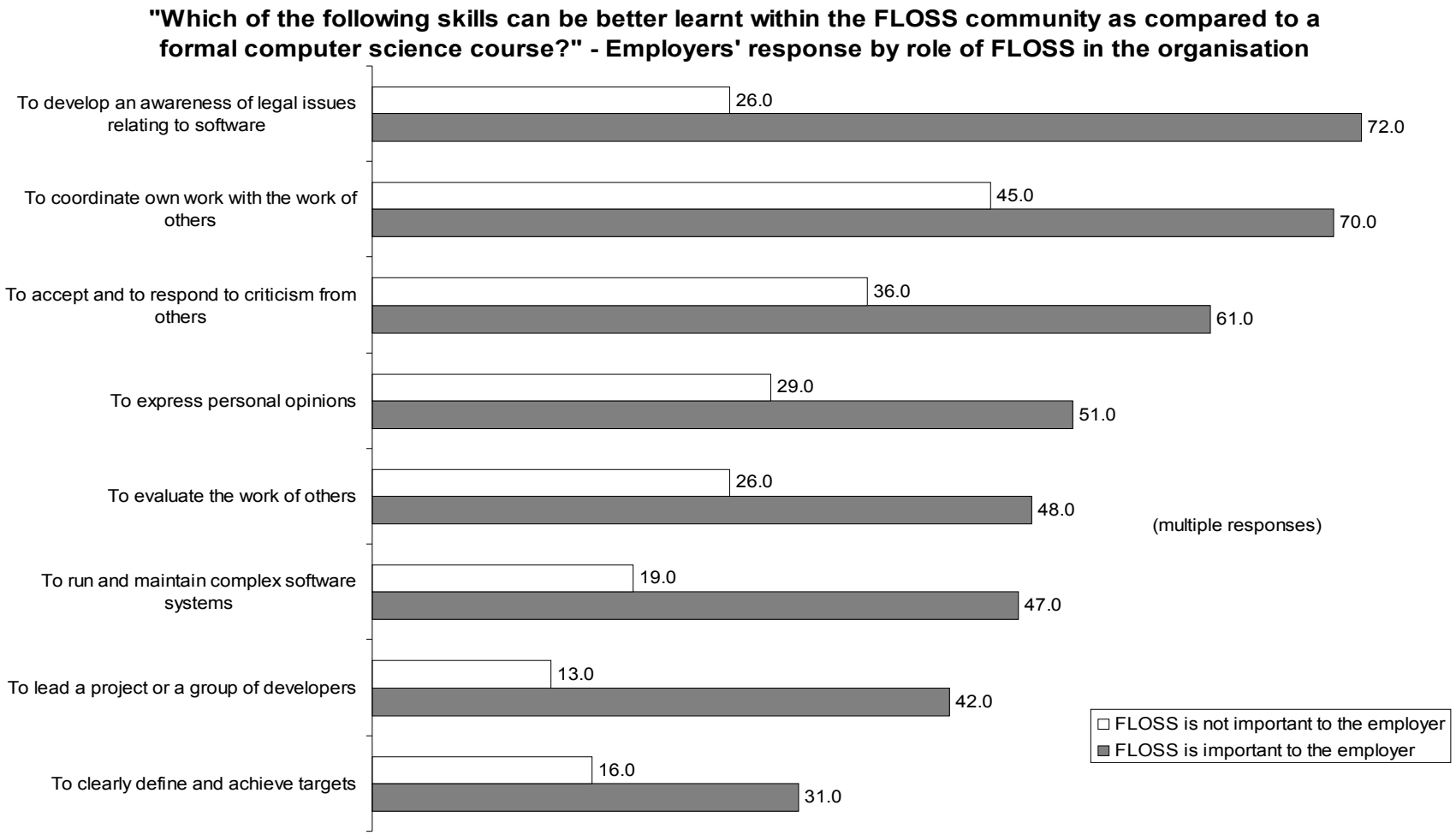
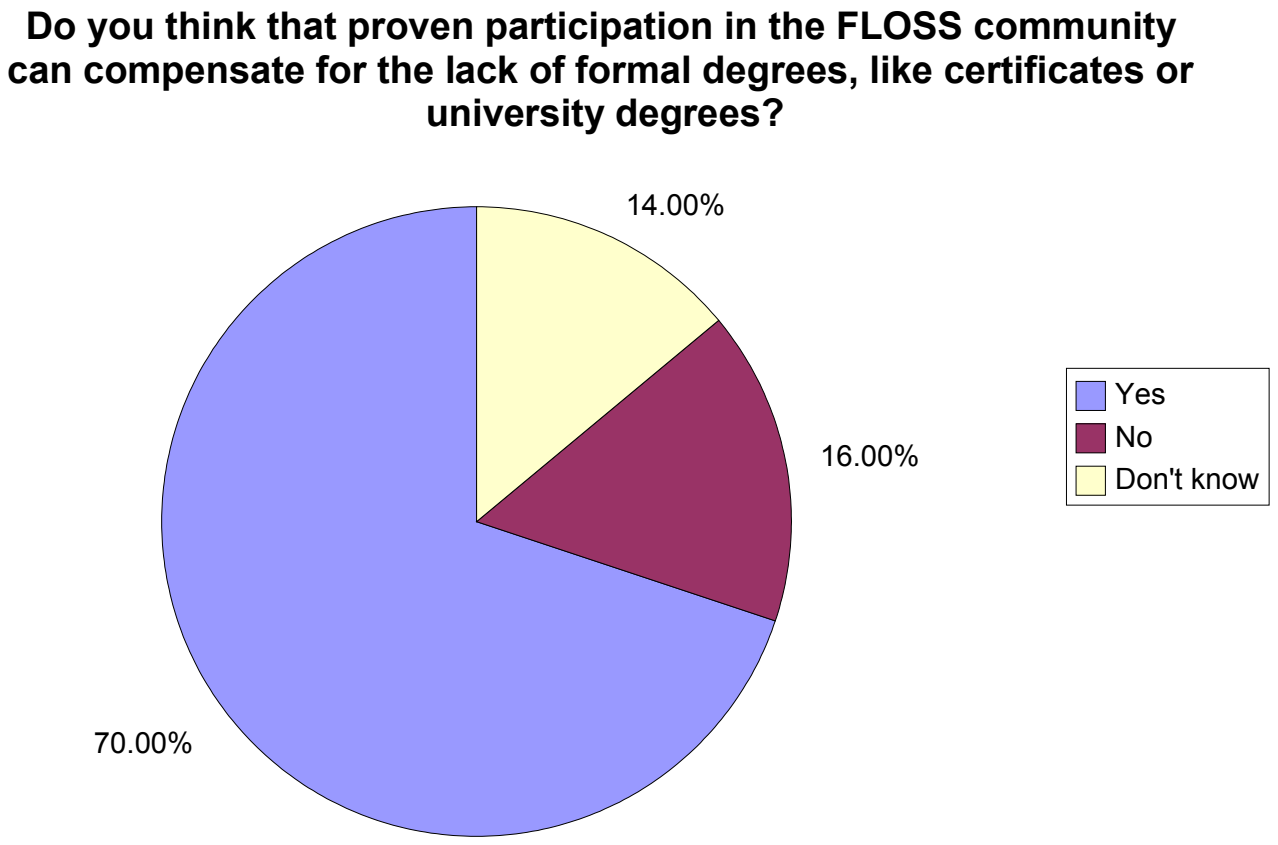


Compensation for no formal degree?



Compensation for no formal degree?

The employers' perspective: (n=114)

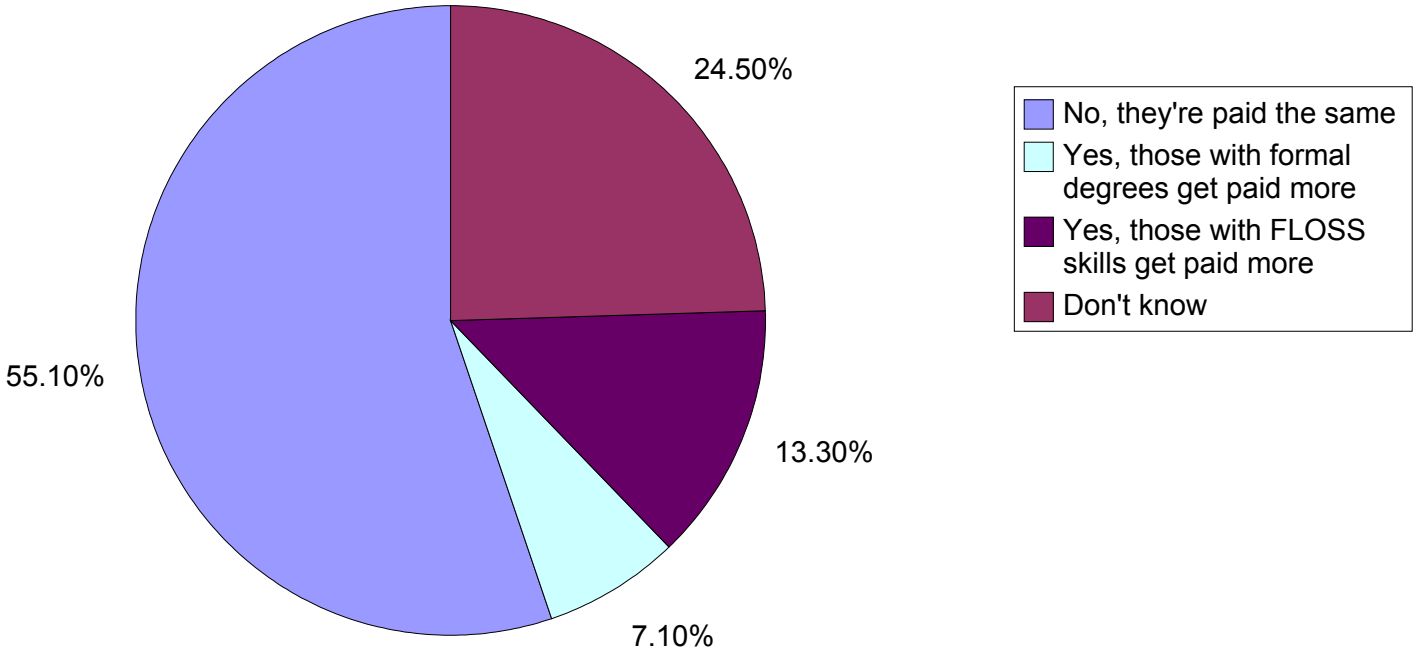
Crosstab

% within How do you assess the role of FLOSS within your organisation?

		How do you assess the role of FLOSS within your organisation?		
		important	hardly important	Total
Do you think that FLOSS experience adds value to a formal comuter science qualification?	Yes	92.8%	67.7%	86.0%
	No	4.8%	9.7%	6.1%
	I don't know	2.4%	22.6%	7.9%
Total		100.0%	100.0%	100.0%

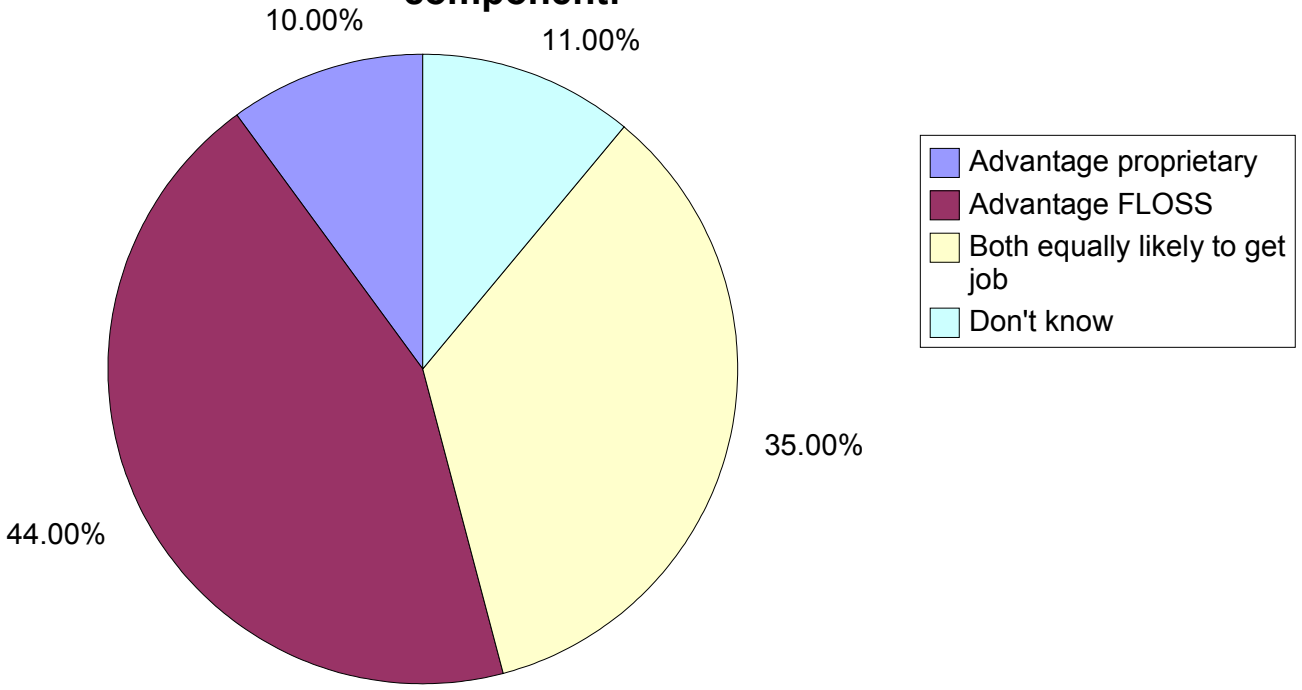
Compensation for no formal degree?

Employers' perspective: Do you offer prospective employees with FLOSS experience different pay than those with a formal degree?:



FLOSS skills valued on the job market

(Dis)advantage on the job market for someone whose past experience is as a proven developer of FLOSS software component vs someone whose past experience is as a proven developer of proprietary software component:



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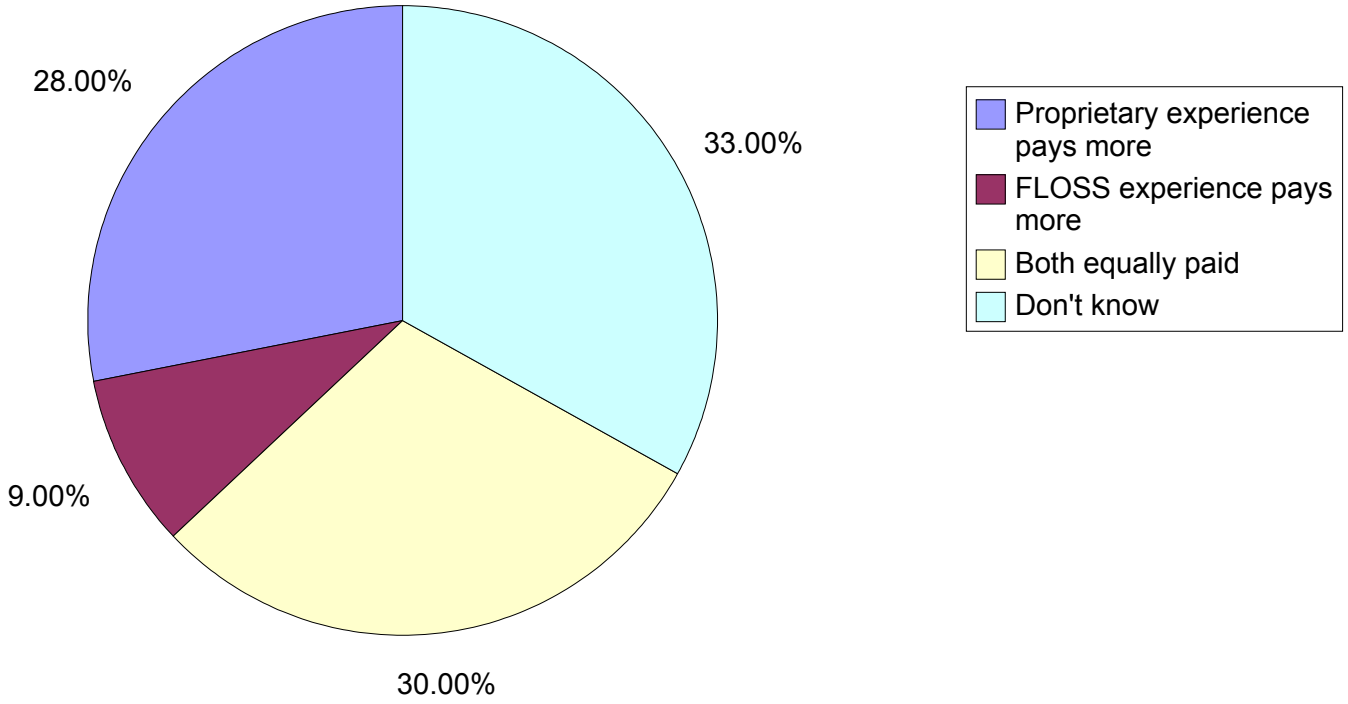
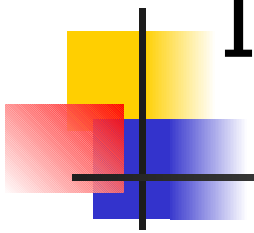
Preference for hiring person with proprietary software skills (A) or with FLOSS skills (B)	Person A (proprietary)	3.6%	22.6%	8.8%
	Person B (FLOSS)	60.2%	12.9%	47.4%
	These differences would not influence my preference	32.5%	51.6%	37.7%
	I don't know	3.6%	12.9%	6.1%
Total		100.0%	100.0%	100.0%

FLOSS skills valued on the job market

Earning differences on the job market for past developer of FLOSS software component vs past developer of proprietary software component (regardless of whether job is with proprietary software or FLOSS):

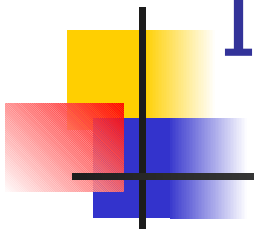


In conclusion



- Skills are learnt in FLOSS community
- Learnt skills not just technical, indeed legal skills are learnt “a lot”
- Those with prior skills learn new ones, especially relating to bug-fixing, writing reusable code
- Wide variety of learning strategies
- Even those taking formal courses rate it relatively poorly as a learning environment

In conclusion



- Several skills are learnt better than in formal courses (learn-by-doing skills – reusable code, bug-fixing, teamwork and coordination)
- Proven FLOSS experience can compensate for lack of formal degrees in order to get a job
- But developers feel those with proprietary experience often get paid more
- Preliminary results from the employer survey appear to confirm the above two findings, though awareness of FLOSS among employers increases their perceived value of skills learnt from FLOSS.

Skills and economic growth

- Skills development: “the ability to create”
  FLOSS is a training environment that increases the earning capacity of community participants without any explicit investment in training: a novel form of technology transfer
- Economic growth: “ability to add value”
  FLOSS allows local entrepreneurs to provide a greater share of total value added, thus retaining a greater share of profits within the local economy

•Building local ICT competencies

- Be passive users of "black-box" software or active participants in global ICT?
- Being active requires being able to create, locally – and choose with the least barriers the level of creativity
- Skills development requires access to the ability to create – you don't have to be a programmer, but you should have the choice.
- Relative local value addition is much higher with free software, as compared to proprietary (where the vendor controls and provides the most value)

More information

- FLOSSPOLS: http://flosspols.org
- FLOSS Project report (2002) http://flossproject.org/report/