

Kaiser, Tim; Menkhoff, Lukas

**Article — Accepted Manuscript (Postprint)**

## Active learning improves financial education: Experimental evidence from Uganda

Journal of Development Economics

**Provided in Cooperation with:**

German Institute for Economic Research (DIW Berlin)

*Suggested Citation:* Kaiser, Tim; Menkhoff, Lukas (2022) : Active learning improves financial education: Experimental evidence from Uganda, Journal of Development Economics, ISSN 1872-6089, Elsevier, Amsterdam, Vol. 157, <https://doi.org/10.1016/j.jdeveco.2022.102870>

This Version is available at:

<https://hdl.handle.net/10419/316698>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<http://creativecommons.org/licenses/by-nc-nd/4.0/>

## **Appendix**

**(online appendix not intended for print publication)**

**to accompany**

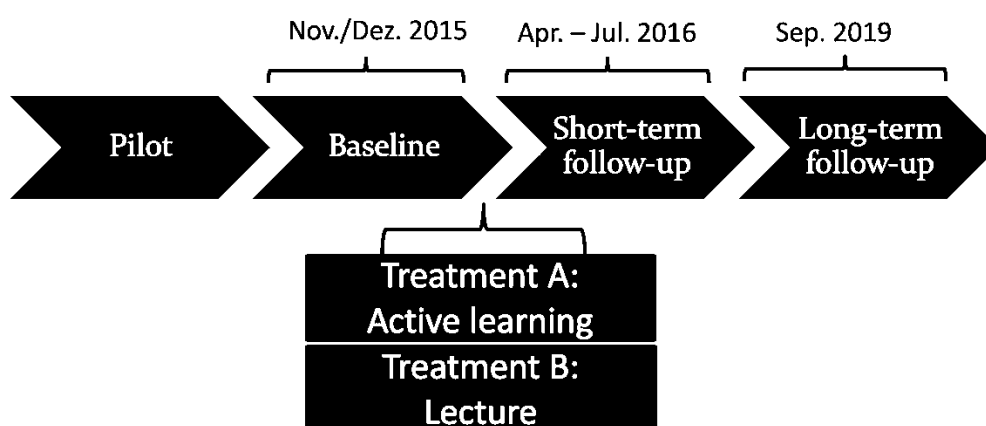
**“Active learning improves financial education:  
Experimental evidence from Uganda”**

Appendix A: Supplementary tables and figures

Appendix B: Robustness checks

## Appendix A: Supplementary tables and figures

Figure A1: Timeline



**Table A1: Overview of financial education treatments**

Topic		Active learning		Traditional lecturing	
		Time (mins)	Activity	Time (mins)	Activity
1	Personal financial management	3	The trainer introduces the topic by asking the participants what they think is involved in personal finance.	20	<p>The lecturer writes the headings of each topic on a flip chart and <u>tells the participants</u> about the learning objectives of the lecture.</p> <p>Learning objectives of the first topic are:</p> <ul style="list-style-type: none"> <li>- The participants are able to differentiate between inflows and outflows</li> <li>- The participants are able to differentiate between wants and needs</li> <li>- The participants know how to create a simple budget</li> </ul>
		10	The trainer reads out a case study of a family with five children, three sources of income and several expenditures. The trainer explains the concept of the “money tree” (metaphor for household budget) with a display and invites participants to identify the family’s inflows (roots) and outflows (leaves) and to place them on the “money tree”. The trainer asks the <u>participants to calculate</u> the total amounts of income and expenditures. Total expenditures are larger than total incomes.		
		5	The trainer asks the participants what they notice about the family’s money tree (defining the problem of overspending) and what could be done about it. The trainer then introduces the concept of needs and wants and <u>asks participants to differentiate</u> between what they consider are the family’s “needs” and “wants” and to remove the wants from the money tree and cluster them elsewhere.		
		4	The trainer introduces the new family budget (after removing the “wants”) and links it to the money tree. A picture of a written household budget is shown to the participants and the trainer <u>asks the participants to give their views</u> on how the family could spend the resulting surplus.		
		3	The session is being wrapped up by <u>asking the participants how they would rate</u> the importance of financial management and whether the introduced concepts are relevant for their own lives.		
2	Savings	3	The trainer, again, refers to the case of the hypothetical family and pins up a definition of “saving” followed by <u>personal questions to the participants</u> : Who is saving? What are you saving for? How often are you saving? Why are you saving? Trainer pins mentioned reasons on a poster and adds those mentioned and notion model cards.	20	<p><u>The lecturer writes</u> the topic of this section on a flip chart and defines the learning objectives:</p> <ul style="list-style-type: none"> <li>- The participants know the meaning of savings</li> <li>- The participants know at least 3 ways to save</li> <li>- The participants know at least 2 benefits of savings</li> <li>- The participants know the trade-off between ease of access (liquidity) and return</li> </ul>
		8	The trainer introduces different ways to save (account, cash, durables,...) and explains that each way of saving comes with a specific “ease of access and return” profile and that these generally resemble conflicting goals. The trainer now <u>asks the participants to indicate their preferences</u> with regard to this trade-off by means of <u>placing themselves on a line on the floor</u> where the far left of the continuum indicates “easy to access” and the far right indicates “high return”. Trainer <u>asks the participants to share the rationale behind their decisions</u> . The trainer now chooses one example of saving forms at a time and asks participants where they would place the different examples of ways of saving. The trainer encourages discussion about these decisions.		
		9	The trainer reads statements on “saving” and <u>asks the participant to cross out wrong statements</u> . This results in a collection of ten		
				5	The lecturer asks the participants whether they have questions or comments.

		statements on the benefits of savings which are subsequently repeated.			
3	Borrowing	5	The trainer asks the participants to share their <u>experiences</u> with loans and subsequently displays a card with a formal definition of a loan.	20	<p>The lecturer writes the topic of this section on a flip chart and defines the learning objectives:</p> <ul style="list-style-type: none"> <li>- The participants are able to differentiate between a sensible and non-sensible reasons to take up a loan</li> <li>- The participants know typical direct and indirect costs of borrowing</li> </ul> <p>The lecturer writes the following keywords on a flipchart and discusses the topics with the participants:</p> <ul style="list-style-type: none"> <li>- <u>Reasons for borrowing:</u></li> <li>- to finance productive investments</li> <li>- to finance consumption goods</li> <li>- to cater for emergencies</li> </ul>
		5	The trainer refers to the hypothetical family and adds more detail to their financial situation. The <u>participants are asked to identify</u> three things that the hypothetical family plans to borrow money for (consumption vs. productive investments).		
		7	The trainer asks the participant what they consider sensible and non-sensible reasons to take up a loan. The <u>participants use cards with example pictures and cluster these</u> on a poster into the two categories. Loans are evaluated on the basis on whether they may put to productive use. <u>Participants agree on the advice they would give</u> this family on which loan to take and which loan not to take.		<p><u>The cost of borrowing</u></p> <ul style="list-style-type: none"> <li>- Direct costs vs. indirect costs of borrowing</li> </ul> <p>Questions to ask a lender before taking up a loan:</p> <ul style="list-style-type: none"> <li>- Interest rate</li> <li>- Collateral</li> <li>- Installments (how much, how often)</li> <li>- Penalties for delinquency</li> </ul> <p>The lecturer asks the participants whether they have questions or comments.</p>
		4	The trainer informs the group that a loan comes with (direct and indirect) costs and is usually tied to specific conditions. <u>The participants are asked to place cards</u> with the various costs of borrowing on the poster.	5	
		2	The trainer concludes with the station and asks whether the participants have any further questions regarding borrowing. The trainer cautions the participants against the use of expensive credit to finance consumption expenditures.		
4	Investment	4	The trainer pins up a card with the word "investment" and <u>asks the participants for a definition</u> . The trainer complements this discussion with a formal definition.	20	<p>The lecturer writes the topic of this section on a flip chart and defines the learning objectives:</p> <ul style="list-style-type: none"> <li>- The participants know what an investment is</li> <li>- The participants know different forms of investment</li> <li>- The participants know the trade-off between safety (minimal risk) and return</li> </ul> <p>The lecturer writes the following keywords on a flipchart and discusses the topics with the participants:</p> <p><u>Forms of investments:</u></p> <ul style="list-style-type: none"> <li>- Animals</li> <li>- Land</li> <li>- Business (own and other's)</li> <li>- Buildings</li> </ul> <p><u>Why invest?</u></p> <ul style="list-style-type: none"> <li>- Create wealth and security</li> <li>- Increase the ability to earn more income</li> <li>- Planning for old age</li> <li>- Create employment opportunities for oneself and others</li> <li>- Short term investment examples</li> </ul>
		13	The trainer requests the participants to reflect on the discussion they have just had about and <u>asks the participants to share their experiences</u> with regard to investments they have made themselves. The trainer then introduces illustrative cards that display either consumption or investment activates and <u>asks participant to assess</u> whether the cards indicate productive investments.		
			The trainer informs participants that each form of investment comes with a unique "safety-return" profile. "Safety" and "return" represent conflicting goals and that an investment always comes with certain risks. The trainer now <u>asks the participants to indicate their preferences with regard to this trade-off by means of placing themselves on a line</u> where the far left of the continuum indicates "safety" and the far right indicates "high return". Trainer asks the participants to <u>share the rationale behind their decisions</u> .		
			The trainer now chooses one example of investment forms at a time and asks participants where they would place the different examples of ways of investing. The trainer encourages discussion about these <u>decisions</u> .		

		8	<p>The trainer refers to the case of the hypothetical family and asks the participants to summarize the investment decisions the family has taken. <u>The trainer asks the participants to summarize the associated risks and benefits of these investment decisions.</u></p> <p>The trainer asks the participants whether they are aware of strategies to manage these risks. Afterwards he introduces the notion of formal and informal insurance, as well as insurance through diversification.</p>		<ul style="list-style-type: none"> <li>- Medium term investment examples</li> <li>- Long term investment examples</li> </ul> <p><u>Investment Risks:</u></p> <ul style="list-style-type: none"> <li>- Loss of value (depreciation)</li> <li>- Theft</li> <li>- Mismanagement</li> <li>- Assets destroyed or damaged</li> </ul> <p>The lecturer draws a line on the flipchart, illustrating the ease of “safety” and “return” trade-off. The lecturer illustrates this using the examples of “land” and “livestock” on the line.</p>
		5			<p><u>Risk management strategies:</u></p> <ul style="list-style-type: none"> <li>- Diversification (“do not put all eggs in one basket”)</li> <li>- Formal and informal insurance:</li> <li>- Insurance premium</li> <li>- Insurance coverage</li> <li>- Insurance contract</li> </ul>
Financial service providers -continued-		6	<p>The trainer refers to the hypothetical case of the family and <u>asks the participants to name institutions</u> where the family could save money at. The trainer classifies these answers into regulated and non-regulated institutions (by the central bank).</p>	20	<p>The lecturer asks the participants whether they have questions or comments.</p> <p>The lecturer writes the topic of this section on a flip chart and defines the learning objectives:</p> <ul style="list-style-type: none"> <li>- The participants know the difference between regulated and unregulated financial service providers</li> <li>- The participants know rights and responsibilities of financial service users</li> <li>- The participants know different options to make money-transfers and payments</li> </ul>
		6	<p>The trainer discusses advantages and disadvantages of financial institutions regulated or not-regulated by the central bank and <u>asks the participants to give the hypothetical family advice</u> on where to save the money.</p>		<p>The lecturer writes the following keywords on a flipchart and discusses the topics with the participants:</p> <p>Classification of financial services sector in Uganda:</p> <ul style="list-style-type: none"> <li>- Tier i - Commercial Banks</li> <li>- Tier ii – Credit Institutions</li> <li>- Tier iii – Micro Deposit Taking Institutions</li> <li>- Tier iv – Other Financial Institutions (e.g. VSLAs, ROSCA Unregulated vs. regulated by the Bank of Uganda (Tier i to iii))</li> </ul>
		7	<p>Trainer introduces the aspect of rights and responsibilities of consumers of financial services. The trainer informs participants that they have rights and responsibilities as Financial service consumers/users. The trainer asks the <u>participants to complete a true/false exercise</u> on statements related to consumer protection rights.</p>		<ul style="list-style-type: none"> <li>- Rights and responsibilities of consumers</li> <li>- <u>Payments:</u></li> <li>- Understanding the costs involved</li> <li>- Keeping ones personal information secure</li> <li>- Make safer payments (track who got it)</li> <li>- Mobile money &amp; transaction costs</li> <li>- Automated Teller Machines (ATMs)</li> </ul>
		5	<p>The trainer moves to a discussion of payment services and <u>asks the participants to name different ways of transferring money</u> (i.e. for remittances) and asks the participants to discuss the costs attached to these services.</p> <p>The trainer closes the station by encouraging the participants to compare prices and to analyze all options available to them to make sound financial decisions.</p>	5	<p>The lecturer asks the participants whether they have questions or comments.</p>

**Table A2: Predictors of selection into survey round**

	1= reached at midline survey	1= reached at endline survey
Active learning	0.257 (0.341)	-0.321* (0.172)
Lecture	-0.522* (0.288)	-0.342** (0.170)
Household size	0.026 (0.038)	-0.021 (0.021)
No. of contributors	-0.109*** (0.037)	-0.060** (0.030)
No. of children	0.086 (0.063)	0.042 (0.030)
Monthly consumption <sup>+</sup>	0.000 (0.000)	0.000*** (0.000)
Monthly income <sup>+</sup>	-0.000 (0.000)	-0.000 (0.000)
Female	0.491* (0.259)	0.058 (0.179)
Age	0.019* (0.011)	0.007 (0.005)
Education (>primary)	-0.113 (0.242)	0.315* (0.163)
Self-control (z)	-0.121 (0.104)	0.101 (0.063)
Fin. numeracy (z)	0.226* (0.125)	0.062 (0.065)
Fin. confidence (z)	0.113 (0.117)	0.069 (0.066)
Cluster size	0.011 (0.029)	0.036* (0.019)
Budgeting index	-0.044 (0.112)	-0.010 (0.072)
Savings index	0.237*** (0.090)	0.078 (0.071)
Borrowing index	0.062 (0.094)	-0.021 (0.061)
Investment index	-0.123 (0.110)	0.068 (0.075)
Fin. service index	0.023 (0.093)	0.126** (0.061)
Pseudo R <sup>2</sup>	0.092	0.093
District FEs	yes	yes
n (Individuals)	1,291	1,291
n (Clusters)	83	83

Notes: Results from logit models and show coefficients as logged odds with standard errors (clustered at the market-level) in parentheses. Missing indicators are omitted from the models, as two variables with low proportions of missing values (“No. of contributors” 1.08 percent and “No. of children”, 1.39 percent missing values) appear to predict selection into midline perfectly, resulting in 29 observations being omitted. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A3: Descriptive statistics and randomization balance for midline sample at baseline**

	Full baseline sample (n=1,291)				Midline sample (n=1,162)			
	Control	Active learning	Lecture	Equality of means (p-val.)	Control	Active learning	Lecture	Equality of means (p-val.)
	Mean (SD)	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	Mean (SD)	
Household size	6.86 (3.52)	7.00 (4.25)	6.64 (3.52)	0.35	6.84 (3.67)	6.76 (4.29)	6.61 (3.74)	0.39
No. of contributors	2.12 (2.01)	2.06 (1.95)	2.19 (1.98)	0.56	2.04 (1.91)	2.02 (1.95)	2.12 (1.90)	0.39
No. of children	4.29 (2.88)	4.29 (3.23)	3.94 (2.75)	0.40	4.32 (2.95)	4.26 (3.18)	4.01 (2.83)	0.50
Monthly consumption <sup>+</sup>	592,748 (404,893)	617,150 (450,766)	570,268 (372,067)	0.86	592,935 (412,093)	623,786 (453,482)	571,278 (380,471)	0.67
Monthly income <sup>+</sup>	222,401 (337,539)	203,232 (283,402)	233,565 (355,164)	0.31	218,343 (340,230)	197,598 (280,814)	215,774 (331,427)	0.69
Female	0.80	0.79	0.80	0.98	0.78	0.77	0.80	0.97
Age	37.72 (12.36)	35.38 (11.53)	35.46 (11.60)	0.14	37.54 (12.83)	35.17 (11.69)	35.92 (12.38)	0.32
Education (>primary)	0.28	0.22	0.26	0.56	0.27	0.22	0.25	0.47
Self-control (z)	0.00 (1.00)	0.08 (1.02)	-0.04 (0.99)	0.66	0.00 (1.00)	0.08 (1.02)	-0.09 (0.97)	0.57
Fin. literacy (z)	0.00 (1.00)	0.11 (0.99)	-0.02 (0.98)	0.86	0.02 (1.00)	0.12 (0.95)	0.01 (0.97)	0.95
Fin. confidence (z)	0.00 (1.00)	-0.04 (0.97)	-0.13 (0.98)	0.19	-0.01 (0.88)	-0.03 (0.86)	-0.06 (0.88)	0.39
Cluster size	17.16 (3.90)	16.70 (4.36)	16.36 (4.35)	0.49	17.12 (3.83)	16.84 (4.26)	16.20 (4.40)	0.43
(1) Budgeting index	0.00 (1.00)	-0.10 (0.91)	0.04 (0.97)	0.68	-0.01 (1.00)	-0.10 (0.91)	0.02 (0.97)	0.75
(2) Savings index	0.00 (1.00)	0.10 (1.12)	0.11 (1.01)	0.25	0.03 (1.02)	0.12 (1.14)	0.10 (1.01)	0.45
(3) Borrowing index	0.00 (1.00)	0.03 (1.24)	0.11 (1.39)	0.25	0.01 (0.95)	0.02 (1.25)	0.11 (1.34)	0.31
(4) Investment index	0.00 (1.00)	-0.04 (1.04)	0.04 (1.05)	0.72	0.00 (1.00)	-0.03 (1.05)	0.04 (1.02)	0.77
(5) Fin. service index	0.00 (1.00)	-0.03 (0.99)	0.10 (1.07)	0.35	0.00 (1.00)	-0.03 (0.98)	0.11 (1.08)	0.35
(6) Summary index	0.00 (1.00)	-0.01 (1.10)	0.14 (1.18)	0.24	0.01 (0.97)	-0.01 (1.11)	0.14 (1.14)	0.31
Joint orthogonality (p-val.)	0.15				0.30			

Notes: <sup>+</sup> indicates that the currency denominated outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. The F-test of joint orthogonality regresses a categorical variable indicating the three groups on the full set of variables. Standard errors are-clustered at the market-level. Tests are unadjusted for multiple hypothesis testing.



**Table A4: Descriptive statistics for process outcome variables at baseline**

	Control	Active learning	Lecture	
	Mean (SD)	Mean (SD)	Mean (SD)	Equality of means (p-val.)
(1) Fin. literacy (z-score)	0.00 (1.00)	0.11 (0.99)	-0.02 (0.98)	0.86
Item 1	0.50 (0.50)	0.57 (0.50)	0.52 (0.50)	0.15
Item 2	0.66 (0.47)	0.68 (0.47)	0.67 (0.47)	0.18
Item 3	0.65 (0.48)	0.62 (0.49)	0.65 (0.48)	0.19
Item 4	0.43 (0.50)	0.42 (0.49)	0.46 (0.50)	0.17
Item 5	0.44 (0.50)	0.53 (0.50)	0.49 (0.50)	0.07
(2) Fin. confidence (z-score)	0.00 (1.00)	-0.04 (0.97)	-0.13 (0.98)	0.19
Item 1	0.41 (0.49)	0.40 (0.49)	0.39 (0.49)	0.27
Item 2	2.56 (0.69)	2.53 (0.71)	2.50 (0.75)	0.55
Item 3	2.56 (0.67)	2.53 (0.69)	2.49 (0.73)	0.51
Item 4	0.59 (0.49)	0.60 (0.49)	0.56 (0.50)	0.79
(3) Self-control (z-score)	0.00 (1.00)	0.08 (1.02)	-0.04 (0.99)	0.66
F-test of joint orthogonality (p-value)				0.44

Notes: For wording of financial numeracy items see Table A14. Fin. confidence is an aggregate measure (equally weighted z-score index of its components and standardized to have a zero mean and a SD of one for the control group) of the following four items: (i) “In case you are dissatisfied with a financial service provider and you complain, do you think that the financial service provider is more powerful than you, and that the complaint will therefore not lead to anything?” (y/n). (ii) “I am confident enough to approach a bank and ask questions to learn more about their products.” (disagree strongly – agree strongly). (iii) “I am confident that among a range of loans offered by different banks, I can choose the loan that best suits my specific needs” (disagree strongly – agree strongly). (iv) Which of the following statements best describes how you last chose a financial product? (a) I considered several products from different companies before making my decision. (b) I considered the various products from one company. (c) I didn’t consider any other products at all (d) I looked around but there were no other products to consider. Category (a) is coded as a binary variable. Self-control is assessed through the following survey question: “If you get money, do you tend to spend it too quickly? (a) often (b) sometimes (c) rarely (d) never. Standard errors are clustered at the market-level. Tests are unadjusted for multiple hypothesis testing. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A5: Descriptive statistics for components of outcome indices at baseline**

	Control	Active learning	Lecture	
	Mean (SD)	Mean (SD)	Mean (SD)	Equality of means (p-val.)
(1) Budgeting index	0.00 (1.00)	-0.10 (0.91)	0.04 (0.97)	0.68
Knows how to write a budget	0.12 (0.33)	0.10 (0.31)	0.10 (0.30)	
Usually keeps track of spending	0.59 (0.49)	0.59 (0.49)	0.64 (0.48)	
Separates business and private budget	0.32 (0.47)	0.28 (0.45)	0.36 (0.48)	
Keeps a written budget	0.24 (0.43)	0.20 (0.40)	0.25 (0.43)	
Has kept track of spending in last 6 month	0.24 (0.43)	0.20 (0.40)	0.24 (0.43)	
(2) Savings index	0.00 (1.00)	0.10 (1.12)	0.11 (1.01)	0.25
Any savings	0.78 (0.42)	0.78 (0.41)	0.81 (0.40)	
Total savings+	336,102 (667,250)	409,960 (845,120)	396,865 (770,338)	
Net savings+	224,729 (760,300)	294,348 (821,473)	264,296 (723,618)	
(3) Borrowing index	0.00 (1.00)	0.03 (1.24)	0.11 (1.39)	0.25
Loans for consumption+	3,592 (24,862)	5,219 (30,854)	5,634 (32,290)	
Loans for productive investment+	151,022 (387,398)	164,710 (419,685)	193,943 (493,829)	
Debt to asset ratio (z)	0.00 (1.00)	0.00 (0.84)	0.05 (0.96)	
Loan if no clear plan	0.01 (0.10)	0.03 (0.18)	0.05 (0.22)	
Can identify “bad” loan	0.89 (0.31)	0.84 (0.36)	0.86 (0.34)	
Ever late payment on loan	0.243 (0.430)	0.256 (0.437)	0.287 (0.453)	
(4) Investment index	0.00 (1.00)	-0.04 (1.04)	0.04 (1.05)	0.72
Total investments+	395,130 (753,875)	418,060 (842,834)	447,655 (823,972)	
Total number of items owned	51.32 (35.58)	46.95 (30.50)	48.80 (28.61)	
Business formally registered	0.228 (0.430)	0.241 (0.428)	0.266 (0.442)	
(5) Fin. services index	0.00 (1.00)	-0.03 (0.99)	0.10 (1.07)	0.35
Ever purchased a formal Insurance product	0.07 (0.25)	0.06 (0.24)	0.08 (0.27)	
Ever used mobile money	0.45 (0.50)	0.44 (0.50)	0.50 (0.50)	

Notes: + indicates that the currency denominated outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. Standard errors are clustered at the market-level. Tests are unadjusted for multiple hypothesis testing.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .s

**Table A6: Analysis of effects on individual items in the financial literacy score**

	(1) Item 1	(2) Item 2	(3) Item 3	(4) Item 4	(5) Item 5
Active learning	0.066 (0.041)	0.013 (0.033)	-0.014 (0.028)	-0.014 (0.038)	0.081** (0.035)
Lecture	0.016 (0.043)	0.004 (0.029)	-0.001 (0.031)	0.031 (0.048)	0.041 (0.034)
$A - B = 0$ (p-value)	0.187	0.757	0.699	0.301	0.330
Mean of $y_t$ in control group	0.509	0.669	0.642	0.459	0.495
Observations	1,162	1,162	1,162	1,162	1,162
Clusters	83	83	83	83	83
District FEs	yes	Yes	yes	yes	yes
$y_{(t-1)}$ covariate	yes	yes	yes	yes	yes

Notes: See questions and definitions in Table A14. Table shows WLS regression results weighted by the inverse probability of selection into the midline sample. Coefficients show results from linear probability models. All models include the lagged outcome at baseline and district-level fixed effects. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A7: Analysis of effects on individual items in the financial confidence score**

	(1) Item 1	(2) Item 2	(3) Item 3	(4) Item 4
Active learning	0.018 (0.052)	0.076 (0.059)	0.087 (0.060)	0.036 (0.040)
Lecture	-0.034 (0.052)	0.087 (0.060)	0.091 (0.056)	0.093** (0.042)
$A - B = 0$ (p-value)	0.336	0.839	0.951	0.115
Mean (SD) of $y_t$ in control group	0.418	2.496 (0.713)	2.476 (0.738)	0.604
Observations	1,162	1,162	1,097	1,136
Clusters	83	83	83	83
District FEs	yes	Yes	yes	yes
$y_{(t-1)}$ covariate	yes	yes	yes	yes

Notes: See definitions in Table A4. Table shows WLS regression results weighted by the inverse probability of selection into the midline sample. Coefficients show results from linear probability models. All models include the lagged outcome at baseline and district-level fixed effects. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A8: Impact of financial education treatments on individual-level income and household-level consumption**

	(1) Income <sup>+</sup>	(2) Consumption <sup>+</sup>
Active learning	-9,071 (38,940)	-21,522 (35,601)
Lecture	-22,470 (47,214)	-18,967 (30,735)
$A - B = 0$ (p-value)	0.763	0.946
R <sup>2</sup>	0.110	0.258
Mean (SD) of $y_t$ in control group	385,181 (560,777)	709,744 (483,259)
Observations	1,136	1,162
Clusters	83	83
District FEs	yes	Yes
$y_{(t-1)}$ covariate	yes	yes

Notes: Table shows OLS regression results of ANCOVA models. + indicates that the outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. All models include the lagged outcome at baseline and district-level fixed effects. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A9: Budgeting index - individual components**

	(1) Knows how to write a budget	(2) Usually keeps track of spending	(3) Separates business and private budget	(4) Keeps a written budget	(5) Has kept track of spending in last 6 month
Active learning	0.004 (0.025)	0.043 (0.040)	0.050 (0.038)	-0.015 (0.037)	-0.011 (0.036)
Lecture	-0.046** (0.021)	0.038 (0.039)	0.062 (0.043)	-0.006 (0.034)	0.001 (0.034)
$A - B = 0$ (p-value)	0.015**	0.893	0.787	0.801	0.724
Mean of $y_t$ in control group	0.097	0.667	0.454	0.287	0.277
Observations	1,162	1,160	1,153	1,157	1,156
Clusters	83	83	83	83	83
District FEs	yes	yes	yes	yes	yes
$y_{(t-1)}$ covariate	yes	yes	yes	yes	yes

Notes: Coefficients show results from linear probability models. All models include the lagged outcome at baseline and district-level fixed effects. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A10: Savings index - individual components**

	(1) Any savings	(2) Total savings <sup>+</sup>	(3) Net savings <sup>+</sup>
Active learning	0.034 (0.022)	100,254.155 (63,986.913)	135,741.583** (63,605.581)
Lecture	0.027 (0.025)	-23,495.884 (68,861.157)	-6,718.931 (67,170.925)
$A - B = 0$ (p-value)	0.759	0.094*	0.049**
Mean (SD) of $y_t$ in control group	0.852	510,283 (927,228)	379,655 (963,133)
Observations	1,162	1,162	1,162
Clusters	83	83	83
District FEs	yes	yes	yes
$y_{(t-1)}$ covariate	yes	yes	yes

Notes: Table shows WLS regression results weighted by the inverse probability of selection into the midline sample. Columns (1) is a linear probability model. All models include the lagged outcome at baseline and district-level fixed effects. + indicates that the outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A11: Borrowing index – individual components**

	(1) Debt to asset ratio (z-score)*	(2) Loans for consumpti on*	(3) Loans for productive investment	(4) Can correctly identify a “bad” loan	(5) Would take loan if no clear plan*	(6) Ever late payment on loan*
Active learning	-0.079 (0.063)	2,335 (5,662)	-13,599 (36,749)	-0.001 (0.010)	-0.049** (0.023)	0.091** (0.037)
Lecture	0.036 (0.091)	13,215 (9,039)	-41,219 (37,141)	0.003 (0.010)	-0.033 (0.022)	0.003 (0.036)
$A - B = 0$ (p-value)	0.204	0.212	0.420	0.754	0.505	0.016**
Mean (SD) of $y_t$ in control group	0.000 (1.000)	21,863 (100,814)	202,821 (479,976)	0.029	0.139	0.266
Observations	1,162	1,162	1,162	1,162	1,143	1,162
Clusters	83	83	83	83	83	83
District FEs	yes	yes	yes	yes	yes	yes
$y_{(t-1)}$ covariate	yes	yes	yes	yes	yes	yes

Notes: Table shows WLS regression results weighted by the inverse probability of selection into the midline sample. Columns (4) and (5) are linear probability models. Dependent variable in Column (1) reports the ratio between debt and household assets and is transformed to a z-score. I Column (2) is the amount credit intended for consumption purposes. Dependent variable in Column (3) is debt intended for productive investments. Dependent variables in Columns (4) and (5) are binary items reporting whether a respondent would be willing to take up a loan if he or she had no plans on how to use the money or whether a respondent can separate between good and bad reasons to take up a loan as stated in a hypothetical example. Items marked with an asterisk (\*) are later rescaled for the composition of the index such that positive values indicate better outcomes and vice versa. All models include the lagged outcome at baseline and district-level fixed effects. + indicates that the currency denominated outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A12: Investment index – individual components**

	(1) Total investments <sup>+</sup>	(2) Business formally registered	(3) Total number of durable items owned
Active learning	94,487.395** (43,563.663)	0.084** (0.034)	5.274** (2.008)
Lecture	51,119.578 (56,228.535)	0.059 (0.037)	2.131 (1.736)
$A - B = 0$ (p-value)	0.484	0.491	0.098*
Mean (SD) of $y_t$ in control group	299,826 (494,339)	0.232	51.225 (34.200)
Observations	1,162	1,144	1,162
Clusters	83	83	83
District FEs	yes	yes	yes
$y_{(t-1)}$ covariate	yes	yes	yes

Notes: Table shows WLS regression results weighted by the inverse probability of selection into the midline sample. Column (2) is a linear probability models. All models include the lagged outcome at baseline and district-level fixed effects. + indicates that the outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A13: Financial services index – individual components**

	(1) Ever purchased a formal insurance product	(2) Has ever used mobile money
Active learning	0.004 (0.026)	0.061 (0.038)
Lecture	0.051 (0.035)	0.034 (0.048)
$A - B = 0$ (p-value)	0.135	0.570
Mean of $y_t$ in control group	0.099	0.439
Observations	1,156	1,162
Clusters	83	83
District FEs	yes	yes
$y_{(t-1)}$ covariate	yes	yes

Notes: Table shows WLS regression results weighted by the inverse probability of selection into the midline sample. Coefficients show results from linear probability models. All models include the lagged outcome at baseline and district-level fixed effects. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A14: Debt taking behavior – additional results**

	(1) Number of loans taken since baseline	(2) Total debt volume <sup>+</sup>	(3) Total amount repaid <sup>+</sup>
Active learning	0.056 (0.053)	-14,556 (31,996)	6,371 (13,512)
Lecture	-0.087* (0.049)	-13,965 (32,119)	1,874 (14,358)
$A - B = 0$ (p-value)	0.009***	0.986	0.746
Mean of $y_t$ in C	0.537 (0.604)	207,992 (408,500)	77,931 (221,046)
Obs.	1,162	1,162	1,162
Clusters	83	83	83
District FEs	yes	yes	yes
$y_{(t-1)}$ covariate	no	yes	yes

Notes: All models include district-level fixed effects. + indicates that the outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A15: Correlation of selected outcomes at midline and endline survey**

	(1) Total savings at midline <sup>+</sup>	(2) Total Investments at midline <sup>+</sup>	(1) Total savings at endline <sup>+</sup>	(2) Total Investments at endline <sup>+</sup>	Late payment (midline)	Late payment (endline)
Total savings at midline <sup>+</sup>	1					
Total Investments at midline <sup>+</sup>	0.228***	1				
Total savings at endline <sup>+</sup>	0.175***	0.234***	1			
Total Investments at endline	0.337***	0.217***	0.348***	1		
Late payment (midline)	-0.004	0.039	0.034	-0.075*	1	
Late payment (endline)	0.015	0.062	-0.021	-0.019	0.152***	1

Notes: This table shows pearson correlation coefficients for selected outcomes. + indicates that the outcome (in Ugandan Shilling (UGX)) is winsorized at the 99<sup>th</sup> percentile. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table A16: Financial numeracy items**

Item	Topic	Question and response options
1	Compound interest	<p>Suppose you borrow 100,000 UGX at an interest rate of 2% per month, with no repayment for 3 months. After 3 months, do you owe</p> <p>A) less than. 102,000 UGX,  B) exactly. 102,000 UGX,  <b>C) or more than 102,000 UGX?</b>  Y) Don't know  Z) Refuse to Answer</p>
2	Inflation	<p>If you have UGX. 100,000 in a savings account earning 1% interest per annum, and prices for goods and services rise 2% over a 1-year period, can you buy</p> <p>A) more than,  <b>B) less than,</b>  C) or the same amount of goods in 1 year as you could today, with the money in the account?"  Y) Don't know  Z) Refuse to Answer</p>
3	Diversification	<p>Is it riskier to plant...?</p> <p>A) multiple crops or  <b>B) one crop</b>  Y) Don't know  Z) Refuse to Answer</p>
4	Interest rate (loan)	<p>Suppose you need to borrow 500,000 UGX. Two people offer you a loan. Which loan represents a better deal for you?</p> <p>A) One loan requires you to pay back 600,000 UGX in 1 month.  <b>B) The second loan requires you to pay back in 1 month 500,000 UGX plus 15% interest.</b>  Y) Don't know  Z) Refuse to Answer</p>
5	(Compound) interest (loan)	<p>If you were offered a loan with 5% monthly interest rate and a loan with 20% annual interest rate, which loan would offer better value?</p> <p>A) 5% monthly interest rate  <b>B) 20% annual interest rate</b>  Y) Don't know  Z) Refuse to Answer</p>



## Appendix B: Robustness checks

This appendix deals with the issue of selective attrition and probes the sensitivity of our results to changes in the empirical strategy and corrections for multiple hypothesis testing.

**Bounds estimates for the financial education treatments at midline.** Similar to Karlan and Valdivia (2011) and Drexler et al (2014), we follow Horowitz and Manski (2000) and Lee (2002) and impute plausible values for missing observations to estimate bounds for the treatment effect. We impute missing values for the treatment groups “active learning” and “lecture” as their respective means minus 0.1, 0.25 or 0.5 standard deviations of the observed distribution for the group. Missing values for the control group are imputed as the mean of the control group plus 0.1, 0.25 or 0.5 standard deviations, respectively. Plausible upper bounds for 0.1, 0.25, and 0.5 standard deviations are calculated analogously.

Reassuringly, results appear robust to scenarios up to -0.5 SD and + 0.5 SD, respectively.

**OLS with covariate adjustment.** Tables B2 and B3 show results using unweighted OLS adjusting for baseline covariates. It may be reassuring that results are similar to the results relying on IPW in the main text.

**Multiple hypothesis testing.** In the main text, we rely on “summary index tests” (Anderson 2008, p.1484) to reduce the number of hypotheses being tested and addressing the danger of false rejections. While the main result of the paper (at midline) is robust to aggregating all outcome variables into a single summary index (see Table 5 of the main text), we implement alternative ways to account for multiple hypothesis testing. Table B4 shows the main experimental results with sharpened q-values based on the approach described in Andersen (2008, p.1487). This approach controls for the False Discovery Rate (FDR), i.e., the expected proportion of false rejections of the null hypothesis. Additionally, we report Westfall and Young (1993) p-values based on the procedure described in Jones et al. (2019). This

approach controls for the Family Wise Error Rate (FWER), i.e., the probability of any false rejections of the null hypothesis.

Due to the limited power of our cluster-RCT, the both the FDR and FWER adjusted p-values are substantially inflated and the results come with substantially more uncertainty. As we address the problem of multiple hypothesis testing using indices for outcome families in the main text, the reader may interpret this result as an additional note of caution regarding the results of our cluster-RCT with limited power.

## References in Appendix B

Anderson, M. L. (2008). Multiple inference and gender differences in the effects of early intervention: A reevaluation of the Abecedarian, Perry Preschool, and Early Training Projects. *Journal of the American Statistical Association*, 103(484): 1481–1495.

Drexler, A., Fischer, G., and Schoar, A. (2014). Keeping it simple: Financial literacy and rules of thumb. *American Economic Journal: Applied Economics*, 6(2): 1–31.

Horowitz, J. L. and Manski, C. F. (2000). Nonparametric analysis of randomized experiments with missing covariate and outcome data. *Journal of the American Statistical Association*, 95(449): 77–84.

Jones, D., Molitor, D., and Reif, J. (2019). What do workplace wellness programs do? Evidence from the Illinois workplace wellness study. *Quarterly Journal of Economics*, 134(4): 1747–1791.

Karlan, D. and Valdivia, M. (2011). Teaching entrepreneurship: Impact of business training on microfinance clients and institutions. *Review of Economics and Statistics*, 93(2): 510–527.

Lee, D.S. (2002). Trimming for bounds on treatment effects with missing outcomes. *NBER Technical Working Paper 277*.

**Table B1: Bounds estimates at midline (indices)**

	(1) -0.50 SD	(2) -0.25 SD	(3) -0.10 SD	(4) Unadjusted	(5) + 0.10 SD	(6) +0.25 SD	(7) + 0.50 SD
Panel A: Savings index (z)							
Active learning	0.078 (0.069)	0.119* (0.069)	0.143** (0.069)	0.161** (0.074)	0.176** (0.070)	0.200*** (0.070)	0.241*** (0.073)
Lecture	-0.119 (0.073)	-0.064 (0.072)	-0.031 (0.072)	0.004 (0.080)	0.013 (0.071)	0.046 (0.072)	0.100 (0.073)
$A - B = 0$ (p)	0.019**	0.027**	0.033**	0.079*	0.046**	0.060*	0.093*
Obs.	1,291	1,291	1,291	1,162	1,291	1,291	1,291
Panel B: Investment index (z)							
Active learning	0.172* (0.090)	0.214** (0.087)	0.239*** (0.086)	0.262*** (0.090)	0.272*** (0.084)	0.297*** (0.083)	0.339*** (0.082)
Lecture	-0.009 (0.085)	0.050 (0.084)	0.086 (0.083)	0.113 (0.090)	0.133 (0.083)	0.168** (0.083)	0.227*** (0.085)
$A - B = 0$ (p)	0.059*	0.083*	0.102	0.125	0.136	0.169	0.240
Obs.	1,291	1,291	1,291	1,162	1,291	1,291	1,291
Panel C: Summary index (z)							
Active learning	0.110 (0.081)	0.150* (0.079)	0.174** (0.078)	0.200** (0.083)	0.206*** (0.077)	0.230*** (0.077)	0.270*** (0.076)
Lecture	-0.062 (0.077)	-0.004 (0.075)	0.031 (0.074)	0.055 (0.081)	0.078 (0.073)	0.113 (0.073)	0.171** (0.074)
$A - B = 0$ (p)	0.043**	0.063*	0.081*	0.100	0.115	0.149	0.229
Obs.	1,291	1,291	1,291	1,162	1,291	1,291	1,291

Notes: All models include district fixed effects as well as the lagged value of the dependent variable as well as missing indicator for missing observations of baseline outcome variables. Standard errors, clustered at the market-level, in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table B3: Main experimental results at midline (OLS with controls instead of IPW)**

	(1) Budget index (z)	(2) Savings index (z)	(3) Borrowing index (z)	(4) Invest- ments (z)	(5) Fin. services index (z)	(6) Summary index
Active learning	0.050 (0.078)	0.197*** (0.069)	-0.011 (0.068)	0.267*** (0.081)	0.095 (0.077)	0.214*** (0.066)
Lecture	0.034 (0.076)	0.031 (0.070)	-0.058 (0.082)	0.151* (0.087)	0.173* (0.093)	0.116 (0.070)
$A - B = 0$ (p-value)	0.837	0.037**	0.598	0.183	0.384	0.151
Mean (SD) of $y_t$ in control group	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Observations	1,162	1,162	1,162	1,162	1,162	1,162
Clusters	83	83	83	83	83	83

Notes: All models include district fixed effects as well as the lagged value of the dependent variable as well as missing indicator for missing observations of baseline outcome variables. Standard errors, clustered at the market-level, in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table B4: Mid- and endline results on selected index components (OLS with controls instead of IPW)**

	(1) Any savings	(2) Total savings <sup>+</sup>	(3) Total investments <sup>+</sup>	(4) Ever used mobile money	(5) Ever late payment on loan
Panel A: Short-term treatment effects (after six months) (n=1,162)					
Active learning	0.045** (0.020)	137,901.288** (64,562.585)	99,313.417** (40,376.374)	0.061 (0.037)	0.087** (0.036)
Lecture	0.029 (0.022)	-10,901.062 (63,931.593)	70,602.340 (50,206.947)	0.033 (0.047)	-0.000 (0.035)
$A - B = 0$ (p)	0.458	0.026**	0.605	0.534	0.021**
Mean (SD) of $y_t$ control	0.854	512,670 (931,318)	301,067 (497,640)	0.441	0.269
Observations	1,162	1,162	1,162	1,162	1,162
Clusters	83	83	83	83	83
Panel B: Long-term treatment effects (after 3.5 years) (n=620)					
Active learning	-0.001 (0.029)	335,279.470 (249,898.577)	323,392.017 (205,786.687)	0.136* (0.070)	0.134** (0.062)
Lecture	0.035 (0.024)	245,110.610 (211,227.543)	123,131.110 (169,416.035)	0.072 (0.066)	0.111* (0.062)
$A - B = 0$ (p)	0.187	0.734	0.377	0.335	0.683
Mean (SD) of $y_{t+1}$ control	0.921	911,557 (1500,392)	811,081 (1288,151)	0.527	0.515
Observations	620	620	620	620	620
Clusters	83	83	83	83	83

Notes: All models include district fixed effects as well as the lagged value of the dependent variable as well as missing indicator for missing observations of baseline outcome variables. Standard errors, clustered at the market-level, in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table B5: Multiple hypothesis testing (FDR and FWER for results on indices at midline)**

	(1) Budgeting index (z)	(2) Savings index (z)	(3) Borrowing index (z)	(4) Investment index (z)	(5) Fin. services index (z)	(6) Summary index (z)
Active learning (SE)	0.052 (0.089)	0.151** (0.073)	-0.021 (0.066)	0.261*** (0.089)	0.098 (0.082)	0.194** (0.082)
[FDR q-value]	[0.880]	[0.168]	[0.880]	[0.064]*	[0.454]	[0.124]
{FWER p-value}	{0.981}	{0.389}	{0.993}	{0.106}	{0.801}	{0.242}
Lecture (SE)	0.009 (0.087)	0.017 (0.081)	-0.079 (0.078)	0.112 (0.090)	0.164* (0.097)	0.059 (0.078)
[FDR q-value]	[0.880]	[0.880]	[0.563]	[0.454]	[0.280]	[0.835]
{FWER p-value}	{0.993}	{0.992}	{0.613}	{0.801}	{0.577}	{0.949}
$A - B = 0$ (p)	0.641	0.139	0.479	0.121	0.507	0.117
Mean (SD) of $y_t$ in control group	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)	0.000 (1.000)
Observations	1,162	1,162	1,162	1,162	1,162	1,162
Clusters	83	83	83	83	83	83

Notes: Table shows WLS regression results weighted by the inverse of the estimated probability of selection into the midline sample. The dependent variables ( $y_t$ ) are equally weighted z-score indices of financial behavior and are standardized to have a zero mean and a standard deviation of one for the control group. All currency denominated outcomes (in Ugandan Shilling (UGX)) within the indices in columns (2), (3) and (4) are winsorized at the 99<sup>th</sup> percentile. Column (6) shows results for an equally weighted z-score index of all five financial behavior indices. All models include the lagged outcome at baseline and district-level fixed effects. Sharpened False Discovery Rate (FDR) q-values (Anderson 2008) accounting for all the hypothesis tests in the table in brackets. FWER Westfall and Young (1993) p-values based on the method by Jones et al. (2019) in braces. Standard errors (clustered at the market-level) are reported in parentheses. \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .