

Sesotho

Dintlha-kgolo tsa Kamano ya Sechaba sa Afrika Borwa le Saense: Diphetho tsa Diphuputso tsa 2022



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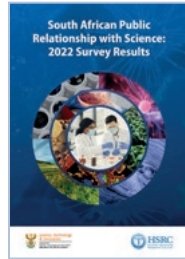
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E hlalitswe ke Lekgotla la Dipatlisiso tsa Mahlale a Batho (HSRC) lebitsong la Lefapha la Saense le Boqapi (DSI).

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Ho qotsa tlaleho ena:

Lefapha le Lokisitsweng ke Lekgotla la Dipatlisiso tsa Saense ya Batho bakeng sa Lefapha la Saense le Boqapi. Pretoria: HRSC. Saense le Boqapi (2024) Dintlha-kgolo tsa Kamano ya Sechaba ya Afrika Borwa le Saense: Diphetho tsa Diphuputso tsa 2022.



Tlaleho ena ya Dintlha-kgolo e ipapisitse le tlaleho e felletseng:

Lefapha la Saense le Boqapi (2024) Kamano ya Sechaba sa Afrika Borwa le Saense: Diphetho tsa Diphuputso tsa 2022. E hlalitswe ke Lekgotla la Dipatlisiso tsa Mahlale a Botho tsa lekala la Saense le Boqapi. Pretoria: HSRC

Nomoro ya Porothokhole ya Komiti ya Boitshwaro REC kapa Nchafatso ya Nomoro ya REC 5/17/08/11: Patlisiso ya Maikutlo a Sechaba ya Afrika Borwa (SASAS) 2019.

Kamano ea Sechaba ea Afrika Boroa le Saense (SAPRS): Liphetho tsa Liphuputso tsa 2022 ke sehlohlolo sa lilemo tse fetang tse nne tsa mosebetsi o kenyelletsang ho nahana ka boithuto ho nts'etsapele lisebelisoa tse bokellang lintlha tse sekasekang data le ho ngola tlaleho.

E ne e le tshebedisano-mmoho dipakeng tsa Karolo ya Kgothaleto ya Saense le Boqapi le Lenaneo la Thuto la Tekano le Meruo (EEE) Lekgotleng la Dipatlisiso tsa Saense ya Botho. Sehlopha sa DSI se ne se etelletswe pele ke Monghadi Isaac Ramovha le sehlopha sa dipatlisiso sa HSRC ke Dr Vijay Reddy.

Nakong ya dilemo tse nne, ditho tsa mantlha tsa sehlopha sa dipatlisiso e ne e le Dr Vijay Reddy, Dr Benjamin Roberts, Mofumahadi Sylvia Hannan le Dr Steven Gordon.



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1 Selelekela

Tsebo ya Saense e eketsa kutlwisiso ya rona ya lefatshe. Rona le boteng ba rona. Ho na le tumellano e anetseng yah ore sepheo sa Saense se lokela ho fetela ho fetela tshusumetso ya moruo le theknoloji, ho sebetsana le diphephetso tsa sekwale-jwale tsa lefatshe le tsa lehaetse amang Bophelo barona ka kotloloho. Ho tloha matsatsing a yona a pele, naha ya demokrasi ya Afrika Borwa e ile ya hlokomela bohlokwa ba kamano pakeng tsa Sechaba le mahlale, le hore MaAfrika Borwa ohle a lokela ho ba le seabo ho holeng ha tsamaiso ya Naha ya Boqapi (NSI).

Lefapha la Saense le Boqapi, mmoho le balejkane ba lone, le na le boikarabelo bah o hodisa dipuisano ts amahlale ka hara NSI. Pampiri e tshweu ya morao-rao e mabapi le Saense, Theknoloji le Boqapi (STI) e ahilwe hodima boikitlaetso ba nako e fetileng ka ho buella Sechaba se tsebang ho bala le ho ngola ka mahlale, mmoho le bakeng sa ho tsepamisa maikutlo bocha ho Saense – dikgokahano tsa Sechaba (DST 2019a). Ho hlahloba Tswelopele e lebisang ho phihlelo ya Sechaba se lakatsehlang sa batho ba tsebang hob ala le ho ngola ka mahlale, DSI e ile ya qala ka ho theha sete ya matshwao ho lekanya tshebetso ya tsamaiso ya mahlale a pharaletseng. Taba ya bobedi, e amohetse sehlopha sa disupa-tshebetso ho tsebisa tlhahlobo ya nako le nako ya Sechaba sa bath oba baholo ba Afrika Borwa ho lekanya le ho beha leihlo maemo a tsebo ya mahlale, maikutlo le boitlamo.

Mananeo a tshebedisano mmoho a Saense le mehato ya dikamano dipakeng tsa Sechaba le Saense di ile tsa hlophiswa ka maano le meralo e mmalwa, e leng moralo wa tshebedisano ya Saense (DST, 2025), Pampiri e tshweu ya Saense,

Thekenology le Boqapi (DST, 2019a), Moralo wa tljhokomelo le Tlhahlobo ya Kopanelo ya Mahlale (DST, 2019b), hammoho le Moralo wa ditshupiso tsa Tekolo le Tlhahlobo ya tshebediso ya Saense (DST, 2021).

Tlhahlobo ya pele e akaretsanf e reretsweng ho metha le ho hlahloba maemo a sechabva a tsebo ya saense, maikutlo, le dipuisano di entswe ka 2022. Phuputso e tla phetwa dilemo tse ding le tse ding tse hlano. Tlaleho e feletseng – [Patlisiso ya Afrika Borwa ya Kamano ya Sechaba le Saense: Diphetho tsa 2022 \(DSI, 2024\)](#) – e phatlaladitswe. Tlaleho ena ya dintlha-kgolo e bontsha ka bokgutshwane mokgwa wa ho ithuta hammoho le Moralo wa ditshupiso tsa Tekolo le Tlhahlobo ya tshebediso ya Saense (SENEIIF) e tsebesitseng kaho ya tsebo ya Saense tse 27, maikutlo, le mehato ya tshebedisano. Kamora moo, re akaretsa diphetho tsa mantlha'ka ho hlalosa maemo (karolelano ya dintlha) mehatong e fapaneng, hammoho le phapang ya dintlha bakeng sa tekanyo ka nngwe. Kamora moo, re tlaleha hore na ditshwanelo dife tsa Sechaba le tsa batho tse neng di ka lebiswa tsebong e nepahetseng ya Saense, maikutlo le dipuisano.

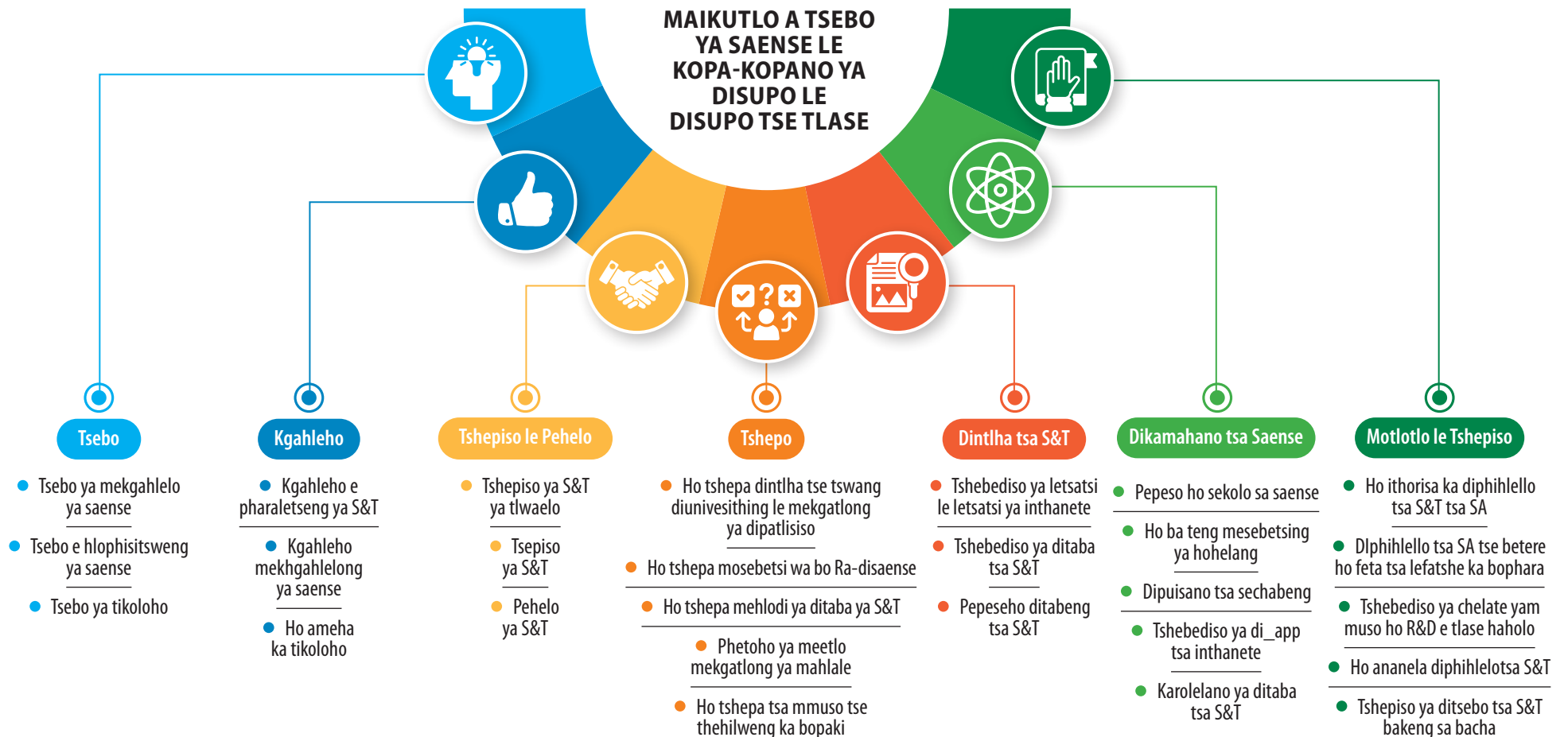
Ebe re hlaisa mehato wa dikamano tsa Sechaba sa Afrika Borwa le Saense re sebedisa palo-hare ya dintlha le diphapano ka har'a mehato e 27 ya Saense. Mehato ena ebe e arolwa ka e nngwe ya mekgahlelo e mene ho latela karolelano ya dintlha tsa bona le phapang ya dintlha. Re phethela ka ho akaretsa diphetho le dikgothaletso.

2 Mokgwa wa Thuto

Qotsulo/Lenane	Qtsulo ya baemedi ba Sechaba sa bath oba baholo ba dilemo di 16 ho ya hodimo, ba kgethilweng dibakeng tse 500 ho tswa diprofinse tse robong.
Saese ya qotsulo	Banka-karolo ba 5 960 qotsulong ya naha.
Sesebediswa sa dipatlisiso le moralo wa tlalelo	Moralo wa ditshupiso tsa Tekolo le Tlhahlobo ya tshebediso ya Saense e tsebisitse entshetsopele ya sesebediswa sa phuputso hammoho le sebopeho sa tlaleho.
Dipuisano tsa Patlisiso	Pakeng tsa Pudungwana 2022 le Pherekong 2023, dipuisano tsa hora e nngwe di shebane le bath oba baholo ba dilemo di 16 ho ya hodimo. Dipuisano di entswe ka e nngwe ya dipuo tse 11 tsa molao, ho latela kgetho ya banka-karolo.
Ho rekota ditaba	Ho sebedisa mokgwa wa ho buisana le motho ka khomputa (CAPI), dintlha rekitilwe tsa kenngwa ho “personal digital assistant” (PDA).
Ho bekgwa hwa dintlha	Dintlha tsohle di bekgilwe lenaneng la bath oba dilemo di 16 ho ya hodimo.
Tlaleho ya diphetho	Diphetho tsa bohlokwa ho latela dipalo-palo tsa boemo ba kgodiseho ya 95% dia tlalehwa.
Diphetho tsa maemo a Sechaba	Dilemo, botho, boemo ba thuto, tshehetso ya thuto ya lapeng e fanwang ke batswadi le batho ba bang ba baholo (ho tshehetsa hob ala, mosebetsi wa sekolo, jwalo-jwalo), maemo a moruo a thehilweng ho index ya thepa, boemo ba mmara wa basebetsi, sebaka sa bodulo, ditumelo tsa bodumedi, le dihlopha tsa baahi di ile tsa sebediswa. Re bua ka tseba e le dihlopha tse nyenyane.
Lentswe “saense” le bolela	Tsebo ya dihlahiswa mekgahlelong ya dithuto: mahlale a tlholeho le saense ya Bophelo, boenjiniere, mahlale a bo-sechaba, le botho.
Lentswe ‘sechaba’ le bongweng le bongateng	Ho na le ‘dichaba tse ngata’ Afrika Borwa tse ipapisitseng le mefuta e fapaneng ya bochaba. Kahoo, lentswe ‘sechaba’ le akaretsa kaofelasechaba ka nngwe le dichaba tse fapaneng ka bongata.
Re sebedisa dintlha tse ithipotileng	Dintlha di ile tsa bokellwa ka mokgwa wa dipotso tsa patlisiso mo barupeduwa ba ileng ba fana ka dikarabo tsa bona ntle le netefatso ya kantle.
Karolelano ya dintlha	Dintlha ytsa kaho e le nngwe le tse ngataadi fetotswe sekaleng sa 0–100. Karolelano ya dintlha di ile tsa balwa mme tsa tlalehwa hodimá kakaretso ya tse 100.
Phapang ya dintlha	Phapano ya dipakeng tsa kakaretso ya dintlha tse hodimo le tse tlase, ka dihlopha tse nyane.

3 Moralo wa ditshupiso tsa Tekolo le Tlhahlobo ya tshebediso ya Saense

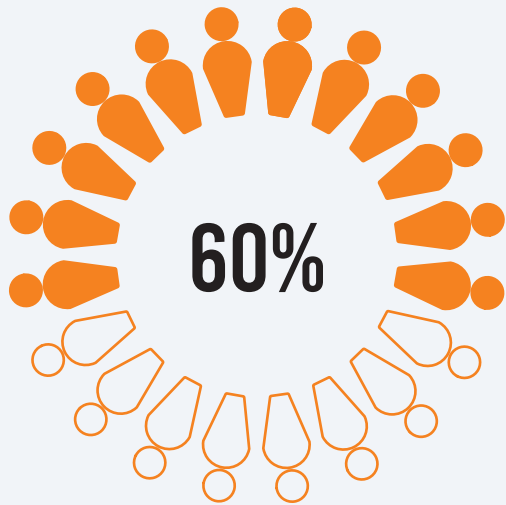
SEMEIIF e ile ya hlahiswa bocha hanyenyane ho kenyeletsa matshwao a supileng kapa dihlooho tsa tshusumetso le matshwao a 27 kapa mehato ya tshusumetso. Dipontsho e ne ele tsebo le thahasello ya saense le thekenoloji (S&T); Tshepiso le pehelo hammoho le maikutlo a tshepo; Dintlha tsa S&T; le diphetho tsa mahlale tsa boitlamo, ho kenyeletsa le maikutlo a amanang le botlotlo le Tshepiso ya S&T. Ho metha le ho sebedisa sesupo se seng le se seng kapa sehloho sa tshusumetso, re kgethile mehato e meraro ho isa ho e mehlano ya tshusumetso. Bakeng sa dintlha tse ding ka diphetho ka kopo sheba **tlaleho ya sehlooho**.



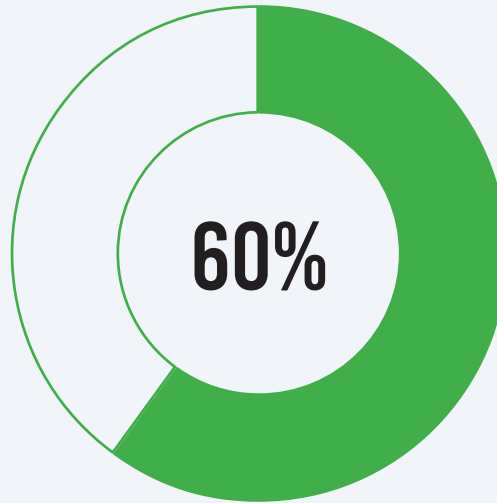
4 Tlhokomediso ya Sechaba le tsebo le thahasello ho saense le thekenoloji

Tlhokomediso le tsebo le thahasello ho S&T di fana ka Lesedi mabapi le mofuta wa dikamano dipakeng tsa Sechaba le saense. Ka thahasello, re bolela ka ho batla ho tseba le ho feta, tsebo e bolela tlhaiso-leseding e o se ntse o ena le yona, athe tlhokomediso e bontsha ho ba le tsebo, le hoja e se hakalo ka kutswisiso.

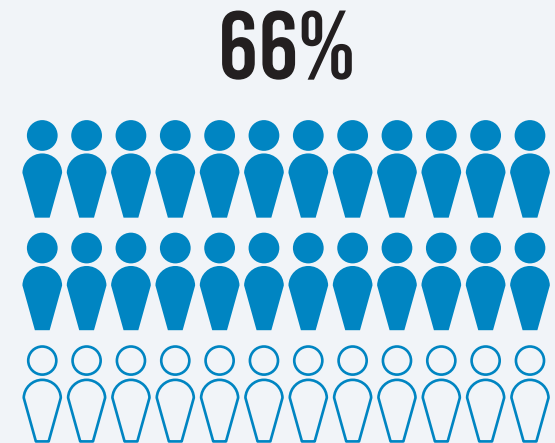
Sechaba se ile sa arabela ka thoko mabapi le maemo a bona a thahasello, tsebo, le tlhokomediso ya S&T. Ka kakaretso, maAfrika Borwa a tseba hantle fela, ba na le tsebo e lekaneng le kgahleho ho S&T.



Ba ne ba tseba
ka S&T



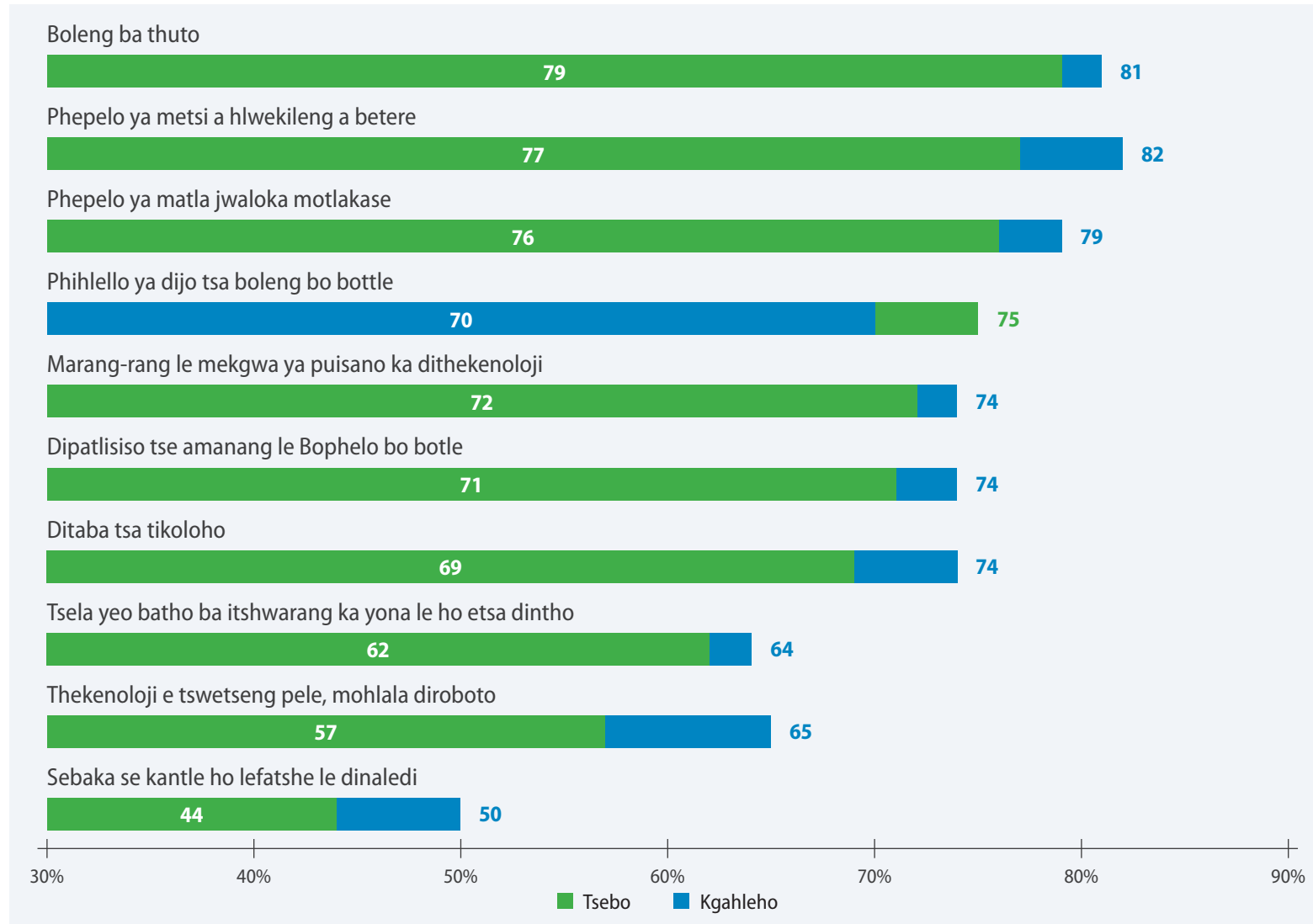
Ba ne ba na le tsebo
ya mantlha ya saense



Ba na le thahasello ho
S&T ka kakaretso

4.1 Peresente ya bath oba baholo ba nang le bonyane tsebo le thahasello mekgahlelong e hodimo ya saense

Ho feta moo, re ile ra hlahloba tsebo ya Sechaba le thahasello ya diholotso tsa sekwale-jwale tsa Sechaba tse hlohang karabelo ya S&T.



BOEMO BO HODIMO BA TSEBO
Boleng ba thuto

79%

BOEMO BO HODIMO BA THAHASELLO
Phepelo e hlwekileng ebile e betere ya metsi

82%

BOEMO BO TLASE KA HO FETISA BA TSEBO LE THAHASELLO
Sebaka se kantle ho lefatshe le dinaledi

50% Kgakheho

44% Tsebo

4.2 Kakaretso ya dintlha tsa tsebo le tsa thahasello ya S&T, tse hlahiswang dihlopheng tsa mekgahlelo e fapaneng



Ke mang ya neng a e na le tsebo e hodimo le thahasello ya S&T?

Ho ne ho e na le phapang e pharaletseng ya dintlha hará dihlopha tse nyenyane, ka kakaretso ya dintlha tsa tsebo ya saense ho tloha ho 46 ho yah o 71 ho tse 100, le bakeng sa thahasello ya saense ho tloha ho 53 ho yah o 75 lekgolong.

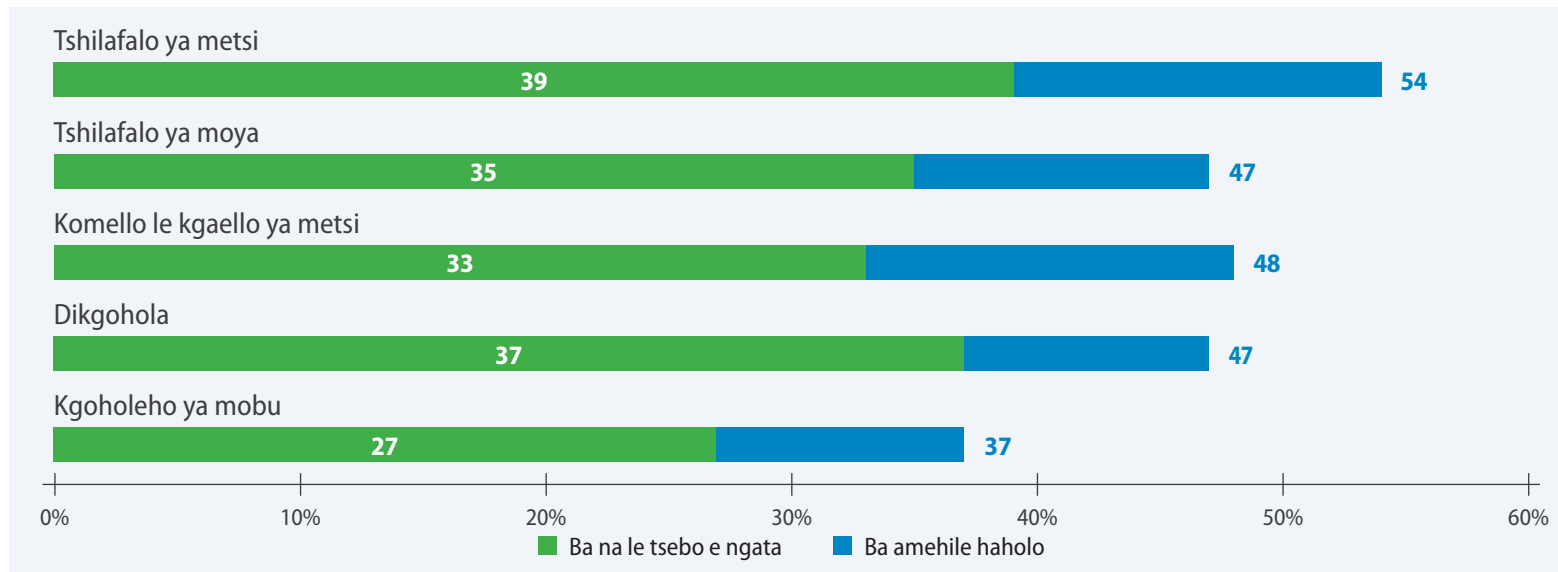
Ba nang le tsebo e hodimo ya saense le thahasello:

- E ne ele ba banyane,
- O fumane thuto ya kamorao ho Meteriki,
- O fumane tshehetso e phahameng ya thuto ya lapeng, le hore
- O tswa malapeng a boemo bo phahameng ba moruo wa Sechaba (SES). Batho ba baholo b makgowa le Malndia/MaAsia ba ne ba ena le tsebo e phahameng ya S&T; athe bath oba baholo ba Makgowa, ba Batsho ba Afrika, le Malndia/MaAsia ba ne ba e na le thahasello.

5 Tsebo ya Sechaba le ameha ka diketsahalo tsa tikoloho

Ditlamorao tsa phetoho ya maemo a lehodimo le diketsahalo tse hloabaetsang tsa tikoloho ke bothata ba lefatshe ka bophara le Afrika Borwa. Batho ba baholo ba bangata ba tlaheha hore ba amehile haholo ka diketsahalo tse na tsa tikoloho ho feta ho ba le tsebo e ngata mabapi le dietsahala tseo.

Peresente ya batho ba baholo ba nang ba na le 'tsebo e ngata' le 'ba amehileng haholo' ka diketsahalo tsa tikoloho



Ba 3 ho ba 4 ba

baholo ba ne ba na le tsebo e itseng le ho ameha ka diketsahalo tsa tikoloho



TSEBO E HODIMO YA LE HO HO AMEHA Diketsahalo tsa tikoloho

47%
Ho ameha

34%
Tsebo



Matshwao a ba nang le tsebo e hodimo le ho ameha ka ditaba tsa tikoloho

- Kakaretso ya dintlha, ka dihlopha tse nyane, e ne e ele pakeng tsa 56 le 74 (ho 100) bakeng sa tsebo ya tikoloho, le pakeng tsa 62 le 83 bakeng sa ho ameha ka tikoloho.
- Batho ba baholo ba nang ba tseba haholwanyane ba bile ba amehile ka diketsahalo tsa tikoloho:
 - O bile le thuto ya kamorá Meteriki, a bile a na tshehetso e hodimo ya thuto ya lapeng,
 - O tswa malapeng a ruileng a SES, le hore
 - O ne a dula metseng ya diteropo le mahaeng.
- Batho ba baholo ba Makgowa le Malndia/MaAsia ba ne ba na le tsebo e hodimo mabapi le diketsahalo tsa tikoloho ha batho ba baholo ba Makgowa, ba Batsho ba Afrika, le Malndia/MaAsia ba ne ba amehile haholo ka diketsahalo tsa tikoloho.

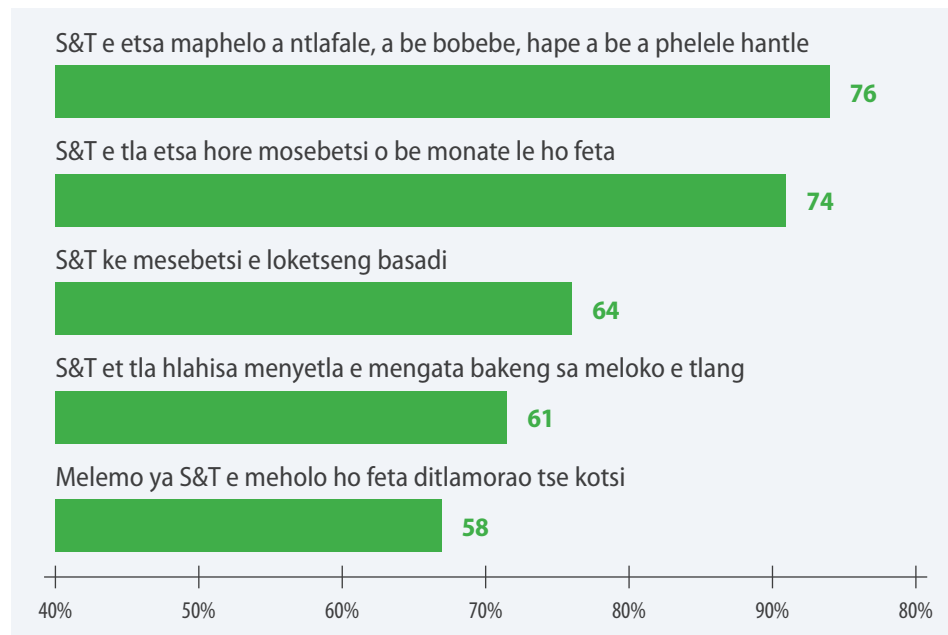
6 Maikutlo a Tshepiso le tshireletso mabapi le S&T ya sekwale-jwale le ya kgale

Sechaba se ile sa arabela dihlopha tsa dintho tse neng di botsa ka maikutlo a sona a Tshepiso (melemo e ka nna y aba teng) le ho behella (dipelaelo, tshabo, le dikotsi) tse amanang le saense ya kajenole yak gale. Sechaba sa Afrika Borwa se ananetse ditshepiso le matshwenyeho mabapi le S&T.

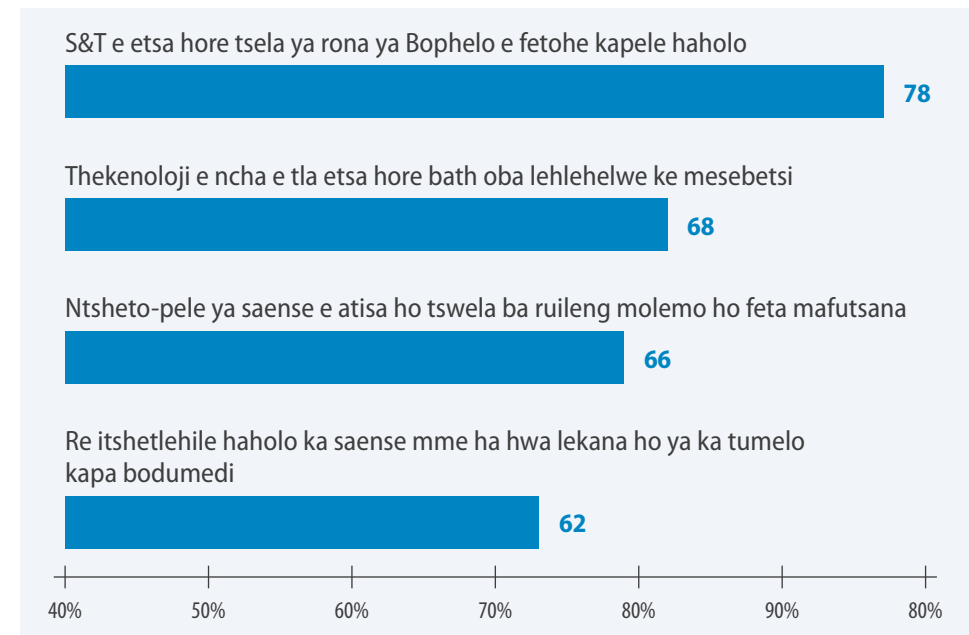
6.1 Maikutlo a Tshepiso le pehelo mabapi le S&T ya sekwale-jwale

Melemo meholo e ka bang teng e thehilweng e ne e amana le S&T ho etsa hore Bophelo ba letsatsi le letsatsi bo ntlafale, bo be bonolo, le ho etsa hore mosebetsi o be monate haholwanyane; leha kameho e kgolo ka ho fetisisa e boletsweng e ne e le mabapi le S&T e etsang hopre tsela ya rona ya Bophelo e fetohle ka potlaako le ho kenya letsoho ho eketseheng hoa teka-tekano.

Tshepiso ya mahlale a morao-rao (% tumellano)



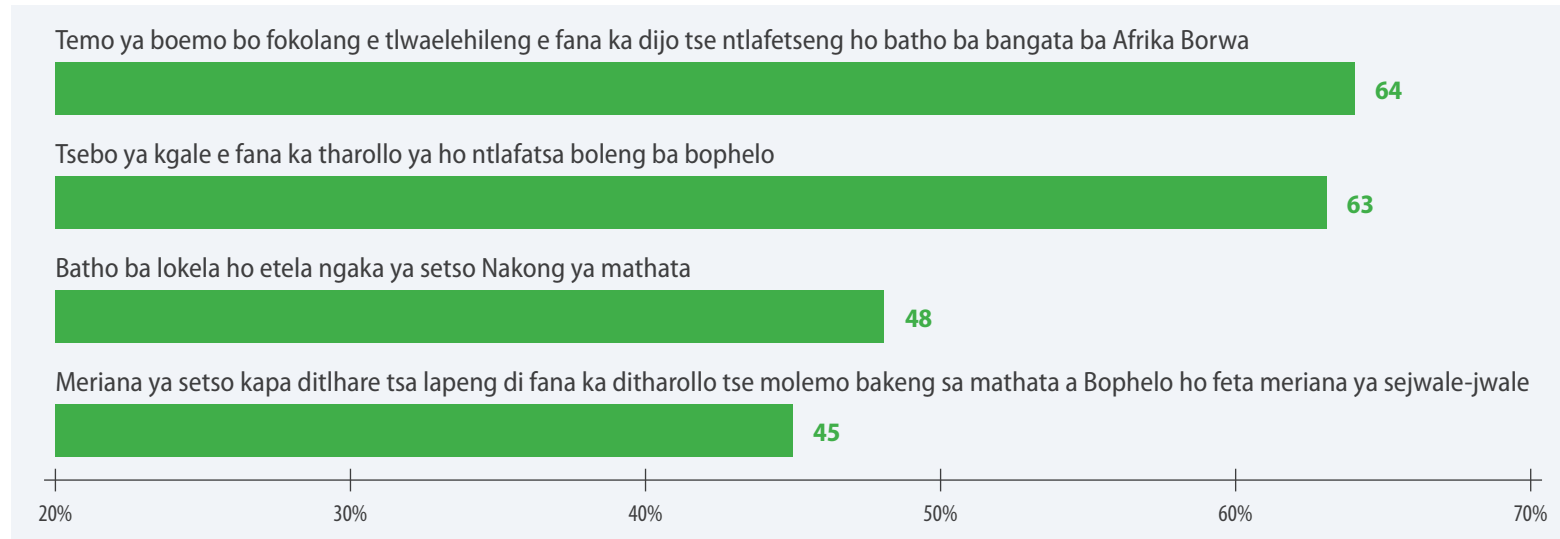
Dipehelo mabapi le saense ya sekwale-jwale (% tumellano)



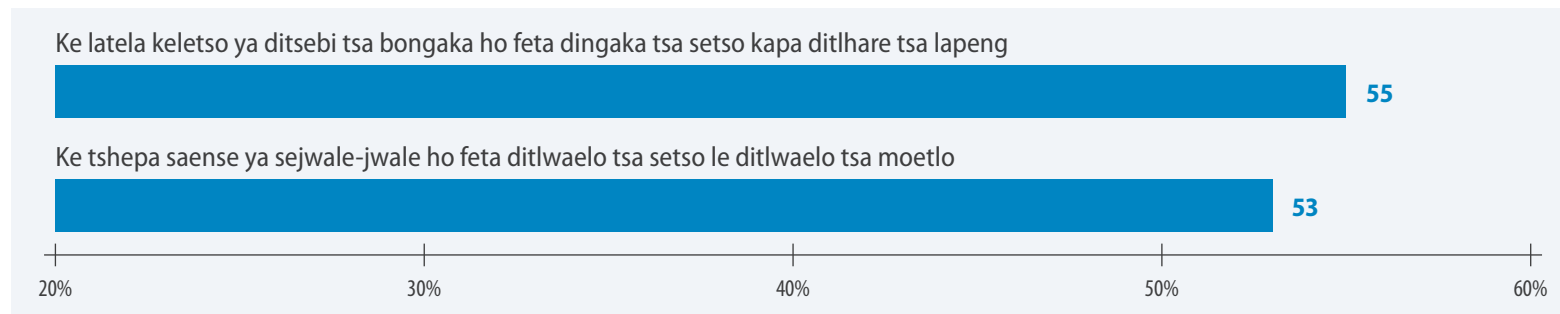
6.2 Maikutlo mabapi Tshepiso le pehele malebana le S&T ya kgale

Saense ya kgale e bolela ditsebio tse ileng tsa fetiswa ho tloha molokong o mong ho ya ho o mong kahar'a Sechaba.

Tshepiso ya saense ya kgale (% tumellano)



Diphehelo mabapi le saense ya kgale ka 2022 (% tumellano)



Batho ba baholo ba 2 ho ba bang le ba bang ba 3 ba

amohetse melemo ya temo e nyane ya setlwaedi le tsebo ya setso tlhahisong ya dijo



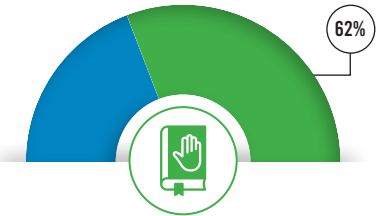
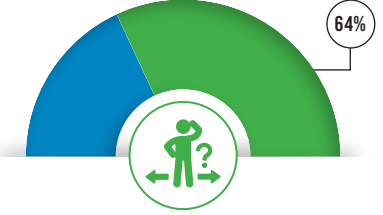
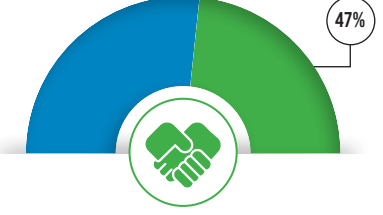
Batho ba abaholo ba 5 ho ba bang le baa bang bang ba 10 ba

hlokometse karolo ya dingaka tsa setso le meriana ya setso



6.3 Maikutlo a kabo ya ditshepiso le dipehelo le hore ke bo mang ba neng ba na le maikutlo a phahameng a ditshepiso le dipehelo

Ho ne hon a le maikutlo a phahameng malebana le ditshepiso le dipehelo mabapi le saense ya sekwale-jwale ho feta saense ya se-kgale. Ho eketsa, ho ne ho na le ohang e fokolang har'a maikutlo a Sechaba a Tshepiso le pehelo (jwalokaha ho bontshwa ke phapang pakeng tsa dintlha tse phahameng haholo le tse tlase ka dihlopha tse nyane) mabapi le saense ya sekwale-jwale ho feta saense ya se-kgale.









	Peresente tsa batho ba baholo ba nang le maikutlo a matla	Dintlha tse phahameng le tse tlase (le phapang)	Ke bo mang ba neng ba ka tlaleha haholo maikutlo a hodimo a Tshepising le hodimo a pehelo?
Tshepiso mabapi le saense ya kajeno		62 ho isa ho 72 = 10 ya dipointe	Batho ba baholo ba nang le thuto e fetang ya mathomo, tshehetso ya thuto e phahameng ya lapeng, le bao e neng e le baithuti kapa barutwana ban ang le maikutlo a hodimo a Tshepiso.
Pehelo malebana le saense ya sekwale-jwale		64 ho isa ho 76 = 12 ya dipointe	Batho ba baholo ba nang le thuto e fetang ya mathomo, tshehetso ya thuto e hodimo ya lapeng, ba ne ba le banyane dilemong, mme ba le MaAfrika a matsho le maIndia/MaAsia ba ne ba na le poloko e hodimo ya maikutlo.
Tshepiso malebana le saense ya se-kgale		49 ho isa ho 70 = 21 ya dipointe	Batho ba baholo ba nang le maemo a tlase a thuto, ba tswang malapeng a futsanehileng, Batho ba baholo ba MaAfrika a matsho le ba buang Tshivenda, isiZulu, le Xitsonga ba tlalehilwe ba na le Tshepiso e hodimo ya S&T ya se-kgale.

6.4 Diphetho tsa maikutlo a Tshepiso le polokeho ha nako e ntse e ya



Bakeng sa dintlha tse hlalisitsweng diphuputsong tsa pejana, re bapisitse diphetho le tlhahlobo ya SAPRS 2022. Ka ho pharalla, diphetho di bontshitse keketseho ya maikutlo a diptshepiso le ho polokeho ha nako e ntse e ya malebana le saense ya sekwale-jwale, empa ho fokotseha ha maikutlo mabapi le ditshepiso le polekeho ya maikutlo malebana le saense ya se-kgale.

Phetoho e kgolo e ne e le maikutlo a Sechaba amabapi le ho eketseha ha teka-tekano ya botho ka dikarabo polelong e reng 'kgatelo-pele ya saense e atisa ho ruisa ba ruileng molemo ho feta mafutsana e eketseha ka karolo ya dipointe tse 17 lekgolong. HGo bile le phokotseho e hlokomelehang ya karolo ya Sechaba e dumetseng hore S&T e tla hlahisa menyetla e mengata bakeng sa meloko e tlang. Leha ho kgotsafatsa ho bona hore Sechaba se sengata se se na le tshepo e hodimo ho saense ya sekwale-jwale le ya se-kgale le ditlwaelo tsa moetlo, hon a le ngongoreho ya hore temoho ya bona tshepising ya temo e nyane e fokotsehile.

Hlokomela: Dintlha tse takilweng ka botala di tlalehwa di na le keketseho e kgolo ya dipalo-palo ho tloha ka 2013 ho yah o 2022, dintlha tse takilweng ka bosehla di bontshitse diphetho tse se bonahaleng haholo, ha tse takilweng ka lamuni di bontshitse phokotseho e bonahalang ya maikutlo.

Saense ya sekwale-jwale: Phetoho ho tloha 2013 ho isa 2022 (Dintlha tsa diperesente)		
Tswelopele ya saense e atisa ho ruisa ba ruileng ho feta mafutsana (R)		+17***
Re itshetlehile haholo ka saense ese ho lekana ho tumelo kapa bodumedi (R)		+7***
S&T e etsa hore tsela ya rona ya Bophelo e fetohe ka potlako (R)		+5***
Melemo ya S&T e meholo ho feta ditlamorao tse mpe tsa yona (P)		+9***
S&T e tla esa mosebetsi o be monate ho feta (P)		+7***
S&T e etsa hore maphelo a rona a ntlafale, a be bonolo, mme a be le boiketlo (P)		0
S&T ke mosebetsi e loketseng basadi (P)		-2
S&T e tla hlahisa menyetla e mengata bakeng sa meloko e tlang (P)		-11***

Dintlha: *** dipalo-palo tse bohlokwa ho $p < .001$

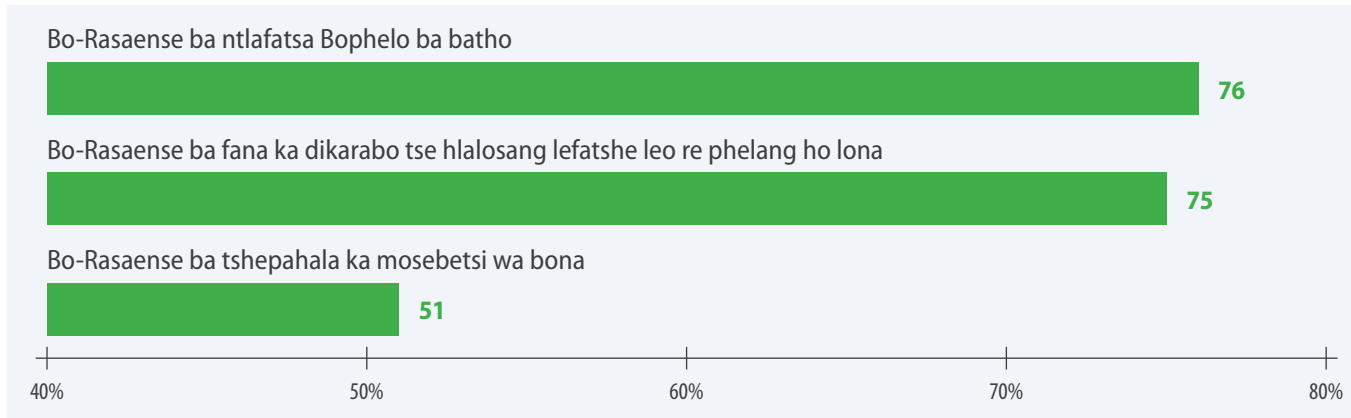
Saense ya se-kgale: Phetoho ho tloha 2009 ho isa 2022 (Diperesente tsa dintlha)		
Temo e nyane ya sekgale e fana ka dijo tse ntlafetseng ho MaAfrika Borwa (P)		-7***
Ke tshepa saense ya morao-rao ho feta ya sekgale le ditlwaelo tsa moetlo (R)		-18***

Dintlha: *** dipalo-palo tse bohlokwa ho $p < .001$

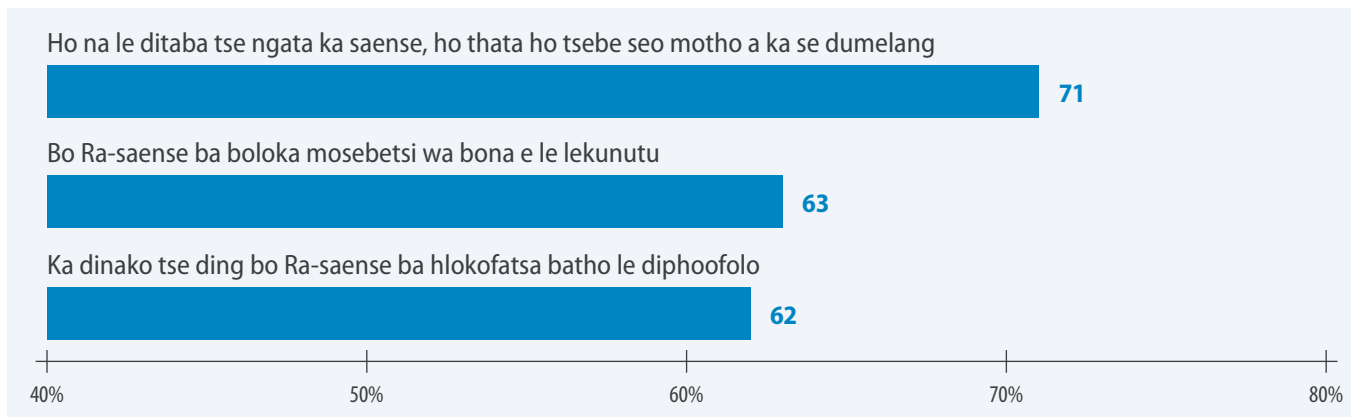
7

Tshepo ya Sechaba masebetsing wa borasaense le ditaba tsa saense ho tswa ditsing

Tshepiso ya mosebetsi wa bo rasaense (% tumellano)



Polokeho ya maikutlo mabapi le mosebetsi wa bo Ra-saense (% tumellano)



Saense le bo Ra-saense ba fana ka ditaba tse nang le bopaki le keletso mabapi le mokgwa wa ho rarolla mathata a Sechaba. Hore keletso e amohelwe, Sechaba se lokela ho tshepa saense le bo-rasaense, hammoho le ho ba le tumelo ho ditsi tse hlahisang tsebo e jwalo.

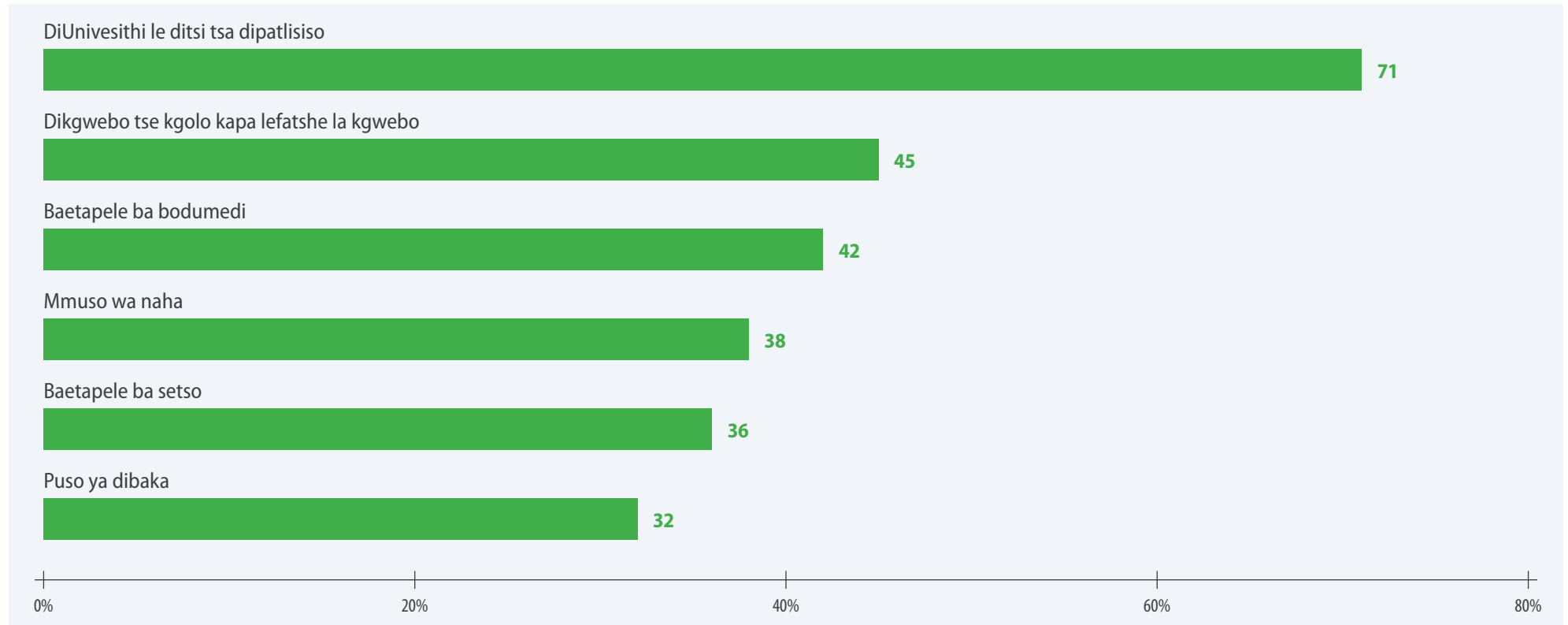


Batho ba baholo ba 7 ho ba bang le ba bang ba 10 ba

ne ba tshepile mosebetsi wa bo ra-saense, hammoho le ditaba tsa saense e fanwang ke di-Univesithi le ditsi tsa dipatlisiso

Ka nako e tshwanang, leha ho le jwalo, karolo e kgolo ka peresente ya Sechaba e ne e na le diphelelo malebana le mosebetsi wa bo ra-Saense hammoho le tshepi e fokolang ho ditaba tsa S&T ho tloha ho baetapele ba bodumedi le mekgatlo ya mmuso. (sheba leqephe le latelang).

Tshepo e tiileng ditabeng tsa S&T ho tswa ho ditsi tse fapaneng (% tumellano)



Ke mang ya neng a na le tshepo e hodimo ho bo Ra-saense le ditaba tsa S&T ho tswa diUnivesithing le mekgatlong ya dipatlisiso?

Sechaba se ne se na le maikutlo a tshwanang, ho sa natsehe phapang ya Sechaba le palo ya batho, tshepong ya bona mosebetsing wa bo Ra-saense le ho tshepa ditaba tsa S&T ho tswa diUnivesithing le ditsing tsa dipatlisiso.

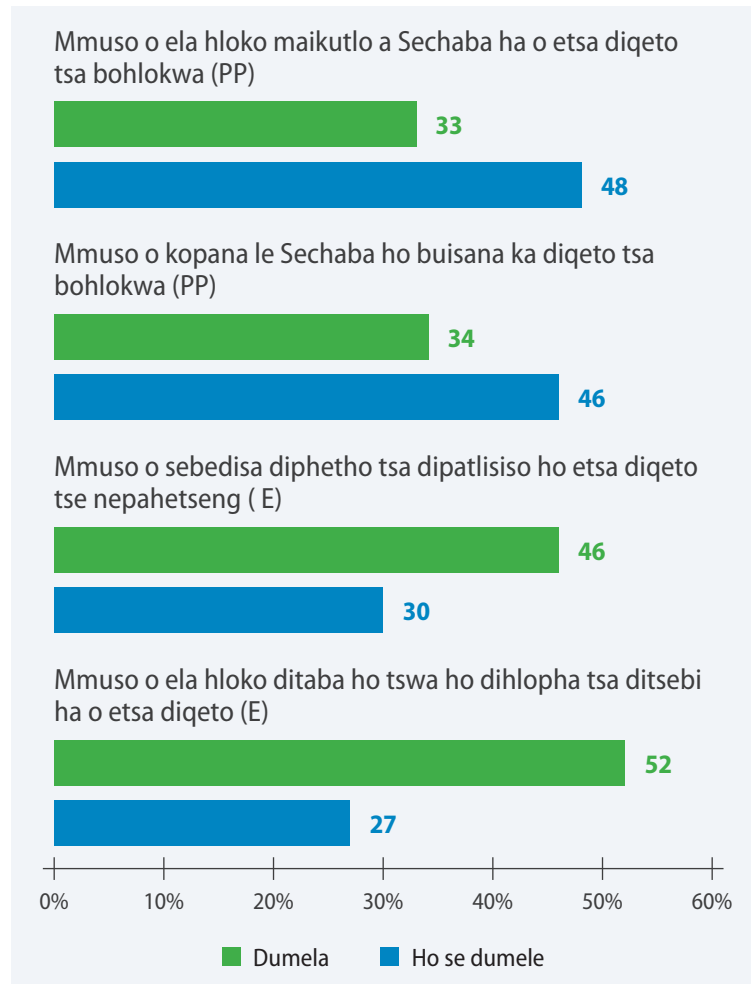
Ba neng ba tshepa bo Ra-saense haholo le ditaba tsa S&T ho tswa diUnivesithing le ditsing tsa dipatlisiso e ne e le:

- Batho ba baholo ban ang le thuto e phahameng,
- Batho ba baholo ban ang le tshehetso ya thuto e phahameng ya lapeng,
- Ba banyane, le
- Baithuti le barutwana.

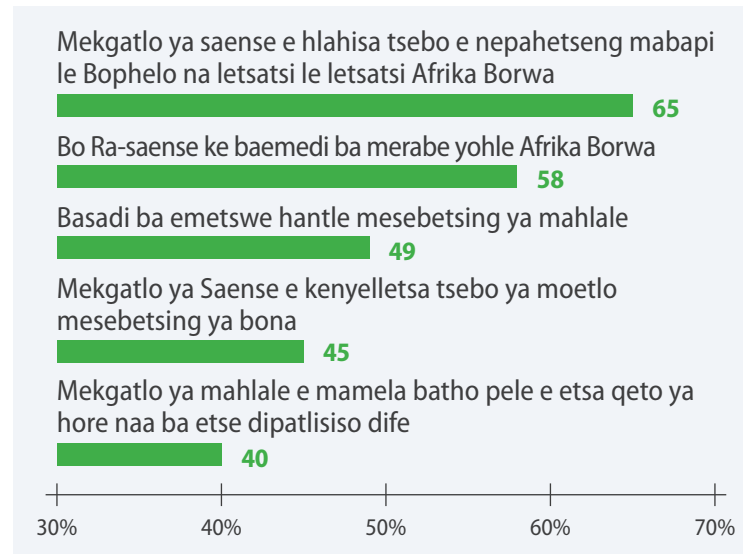
8

Tshepo e tiileng ya Sechaba mekgweng ya mmuso ya ho etsa diqeto le phetoho ya ditlwaelo ka har'a mekgatlo ya saense

Tshepo e tiileng ditshebeletsong tsa mmuso tse thehilweng ho ipapisitse le bopaki (E) le tsamaiso ya diqeto tsa bonka-karolo (PP) (% tumellano le ho se dumellane)



Meetlo kahar'a mekgatlo ya saense ysa fetoha (% tumellano)



Batho ba baholo ba 3 ho ba bang le ba bang ba 10 ba

tlalehwa ba na le tdshepo e kgolo ho etseng diqeto hwa mmuso



Batho ba baholo ba 4 ho ba bang le ba bang ba 10 ba

dumetse hore meetlo har'a ditsi tsa saense ya chench

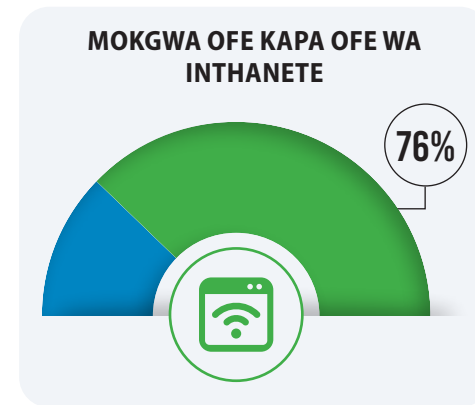
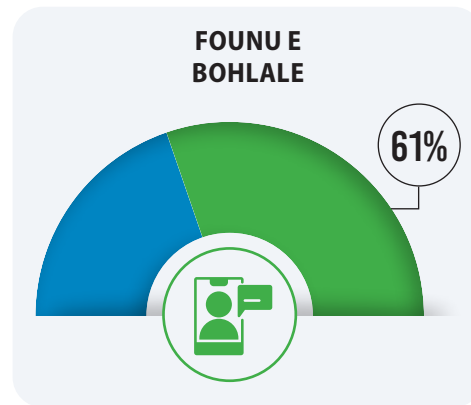
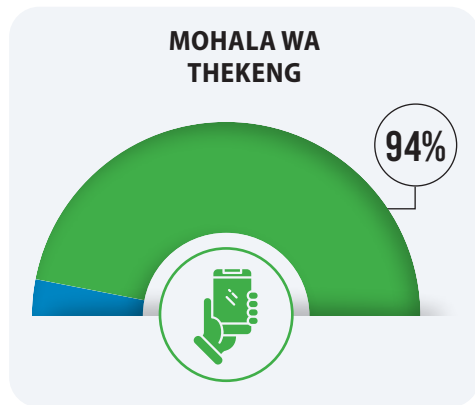


- Ho ne no le tshepo e fokolang ditshebeletsong tsa mmuso tsa ho etsa diqeto le phetoho ya meetlo kahar'a mekgatlo ya saense.
- Phapang pakeng tsa dintlha tse phahameng le tse tlase ka ho fetisisa, ka dihlotshwana, bakeng sa tshepo ho diqeto tsa mmuso e ne e le e dintlha tse 11 tse tshesane; ha phapang bakeng sa tumellano yah o fetoha ha meetlo ditsing tsa saense e ne le e tshesane ka dintlha tse 8.
- Ma Afrika Borwa a na le tshkamelo yah o amohela maikutlo a tshwanang mabapi le diqeto tsa mmuso le phetoho ya meetlo ditshebeletsong tsa saense, ho sa natse dimelo tsa bona tse fapaneng.
- Batho ba abaholo ba MaAfrika a matsho ba na le tshepo e hodimo ditshebeletsong tsa mmuso tsa ho etsa diqeto mabapi le meetlo har'a mekgatloya saense.

9 Ditaba tsa S&T: Phihleleho, ho pepeseha, tshebediso, le tshepo

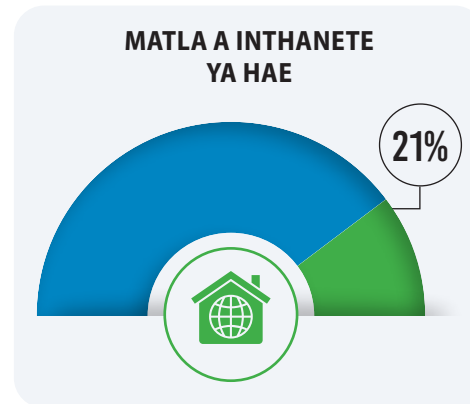
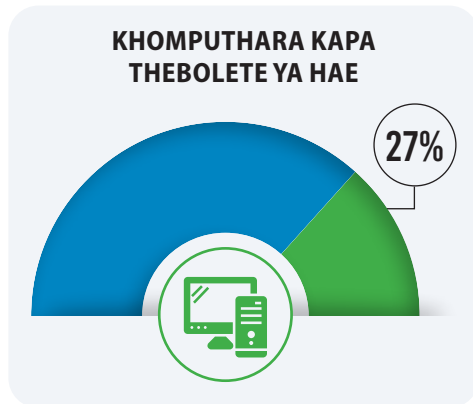
Kamano e ntle pakeng tsa saense le Sechaba e itshetlehlile ka ho arolelana ditaba tsa S&T le ho netefatsa hore Sechaba se kgona ho fumana le ho tshepa ditaba tseena. Phihlello ya Sechaba ya disebediswa tse digital le inthanete e bapala karolo e kgolo ho ba nolofalletsa ho fumana ditaba.

Ka 2022, phihlello ena ya dijithale le marang-rang e bile ka tsela e latelang:



Batho ba 3 ho ba 4 ba
ne ba na le mokgwa wa ho sebedisa inthanete

An icon showing four stylized human figures. The first three are filled with orange, and the fourth is an outline, representing 75%.



Ba 6 ho ba 10 ba
ne ba na le founu e bohlale

An icon showing ten stylized human figures. The first six are filled with orange, and the last four are outlines, representing 60%.

9.1 Mekgwa yah o fihlella le tshebediso ya inthanete

Motho a moholo a 1 ho ba 4 o



ne a sena mokgwa wa ho fihlela inthanete

Motho a moholo a 1 ho ba 3 o



ne a sebedisa inthanete hangata (ho fetadihora tse nne matsatsing a mangata)

Tshebediso ya letsatsi le letsatsi ya marang-rang e ne e fapane haholo, ho tloha hodimo ho 85% bakeng sa ba nang le thuto e hodimo hoy a tlase hoy a 15% bakeng sa ba nang le thuto ya mathomo fela.

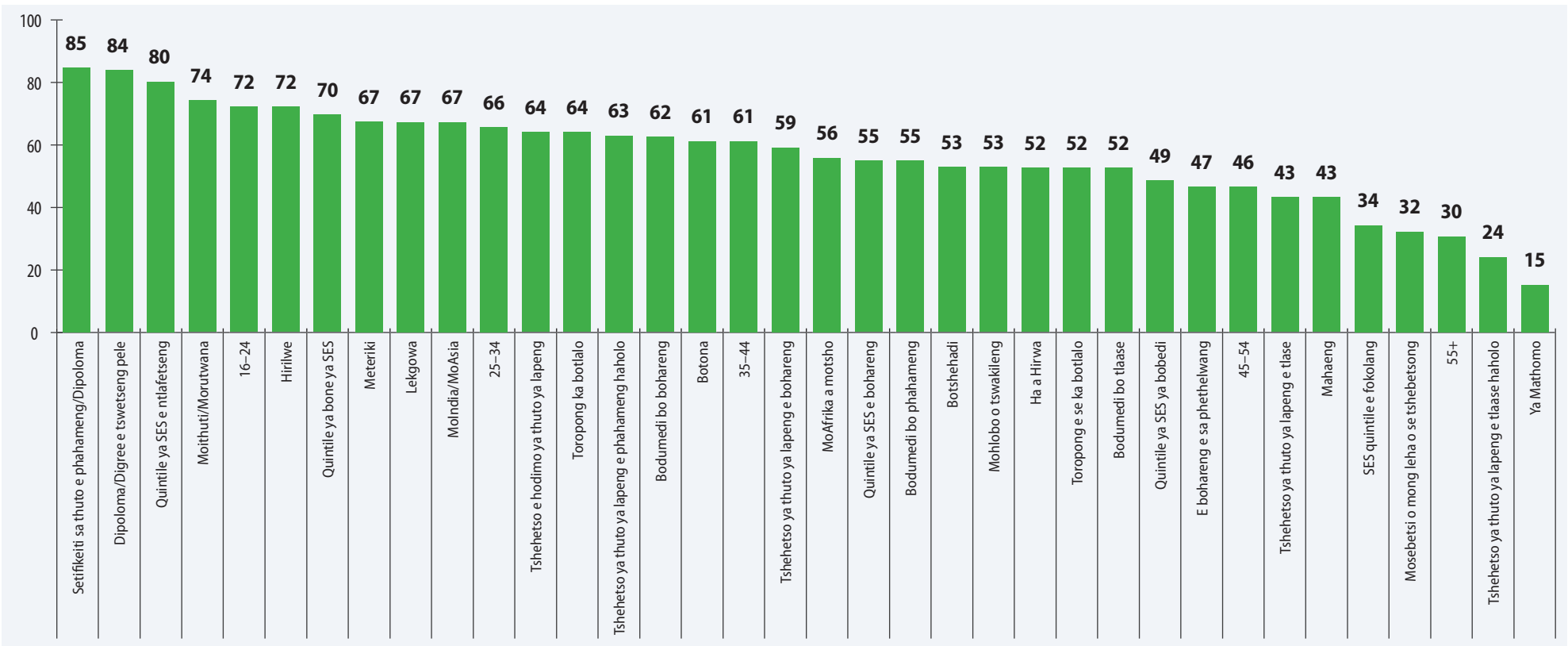
Ke mang ya neng a na le tshebediso e hodimo ya inthanete

Ba nang le tshebediso e hodimo ya inthanete e ne e le:

- Batho ba baholo ba fihletseng thuto ya materiki ho ya hodimo, le tshehetso ya thuto e phahameng ya lapeng,

- Ba banyane,
- Baitluti, barutwana, le ba sebetsang,
- Ho ba ruileng ho tloha mahaeng a SES, le
- Batho ba baholo ba Makgowa le Malindia/MaAsia.

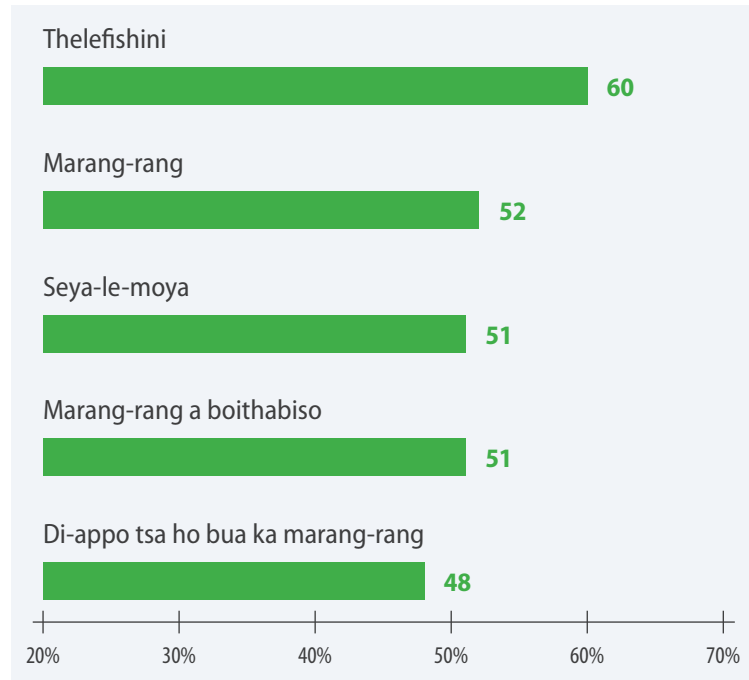
Mokgwa wa tshebediso ya letsatsi le letsatsi ya marang-rang ka ditshobotsi tsa Sechaba le batho (%)



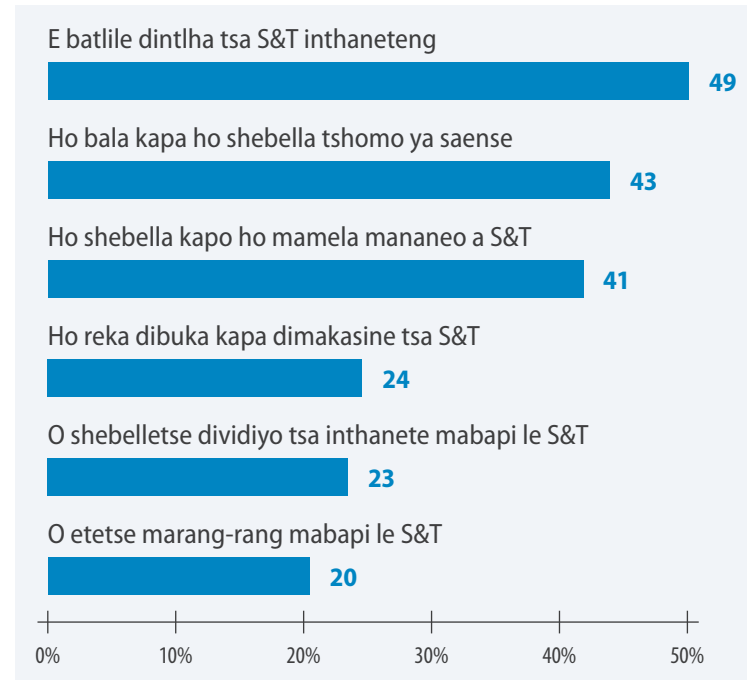
9.2 Pepeso le tshebediso ya ditaba tsa S&T

Ditaba di bohlokwa ho etsa diqeto mme kampor'a moo di ka susumetsa diketso le boitshwaro. Sechaba se tlalehile hore se fuwe monyetla (ho amohela) le ho sebedisa (ho fumana ka mofolofolo) dintlha tse tlase tsa S&T.

Mehlopi e tsebahalang haholo ya ditaba tsa S&T (% bonyane ka beke)



Ditsela tse tsebahalang haolo tseo ditaba tsa S&T di sebedisitsweng ka teng (% bonyane ka dinako tse ding)



- Ho ne hona le phapang e pharaletseng bakeng sa ho pepesetswa le ho sebediswa ha dintlha tsa S&T ka dihlopha tse nyane, tse nang le dintlha tse fapaneng ho tloha ho 22 ho yah o 51 ho tse 100 bakeng sa ho fumana ditaba, le 27 ho isa ho 47 bakeng sa tshebediso ya ditaba.
- Ba neng ba pepesehile ho, le ho sebedisa, dintlha tse ding tsa S&T:
 - O bile le boiphihlelo bo boholo ba thuto,
 - O bile le tshehetsop ya thuto e phahameng ya lapeng, le
 - Ba ne ba le banyane, baithuti le barutwana.

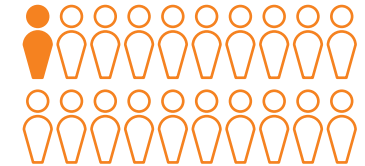
Batho ba baholo ba 2 ho ba 10 ba

fumane ditaba tse ngata tsa S&T



Batho ba abaholo ba 1 ho ba bang le ba bang ba 20 ba

sebedisitse ditaba tse ngata tsa S&T



MOHLODI O TUMMENG HAHOLO WA DITABA TSA S&T
Thelefishini

60%



MOKGWA O TLWAELEHILENG HAHOLO WA HO FUMANA KA MAFOLOFOLO DITABA TSA S&T

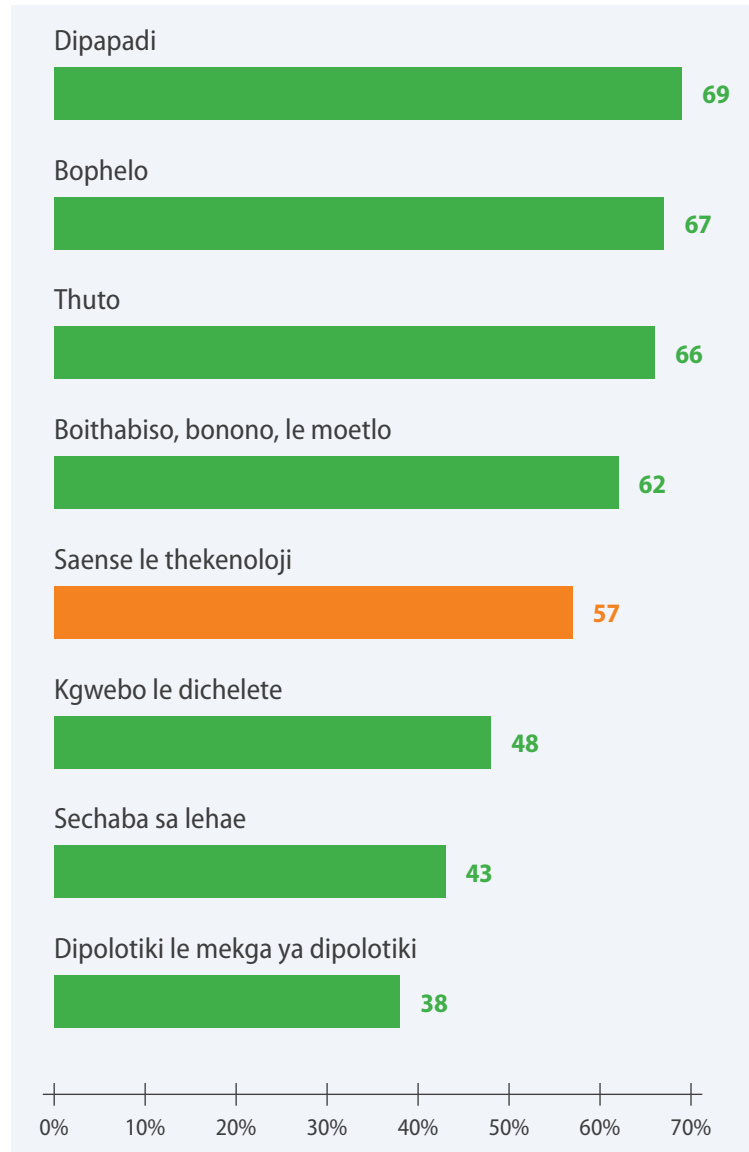
Dipatliso tsa inthanete

49%

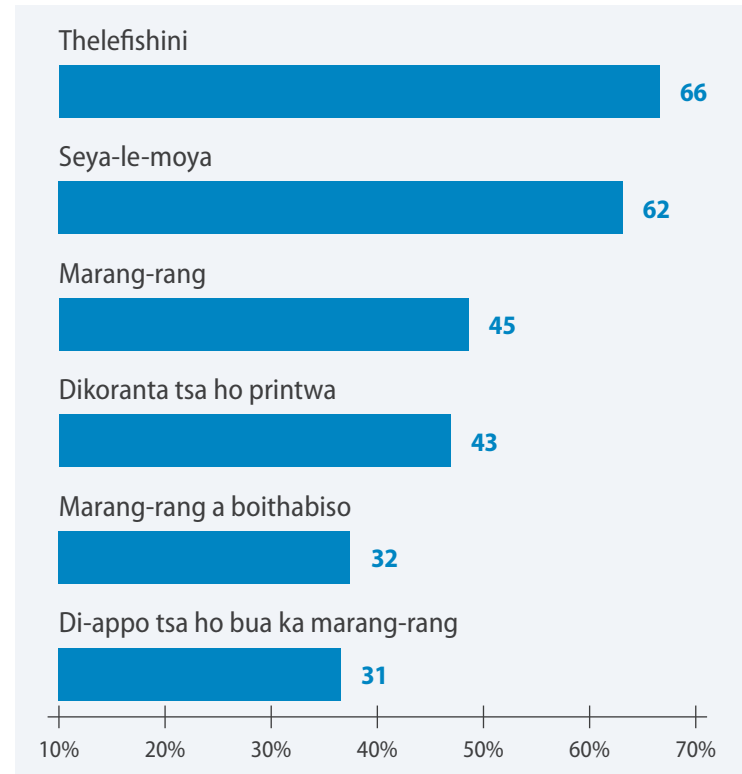


9.3 Tshepo ya ditaba le mehlodi ya ditaba

Tshepo ya ditaba (%)



Tshepo ya mehlodi ya ditaba tsa S&T (%)



- Ho sa tsotellehe dimelo tsa bona tse fapaneng, maAfrika Borwa a ne a na le tshepo e tshwanang mehloding ya ditaba ya S&T.
- Ba neng ba na le tshepo e kgolo mehloding ya ditaba ya S&T e ne e le bath oba baholo ban ang le thuto e hodimo, tshetso e ngata ya thutpo ya lehae, le ba banyenyane, baithuti, barutwana, le ba sa sebetseng.

Ba 6 ho batho ba baholo ba 10 ba

ne ba kgotsofetse ke mokgwa oo mecha ya ditaba e tlahileng ditaba tsa S&T ka yona



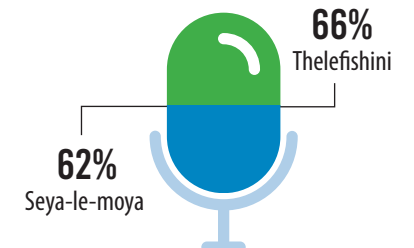
MAEMO A PHAHAMENG KA HO FETISISA A HO TSHEPA DITABA

Dipapadi

69%

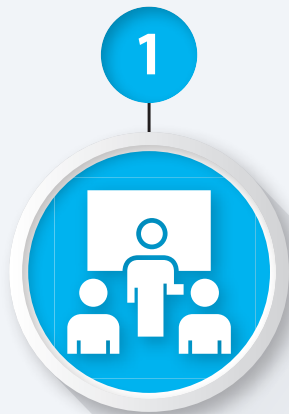


MOHLODI O TSHEPAHALANG HAHOLO HO FETISA DITABA TSA S&T Thelefishini le seya-le-moya



10 Diphetho tsa boikopanyo tsa Saense: Diketso le boitshwaro

Ba arabetseng diphuputsong ba ile ba botswa hore naa ba nkile karolo mesebetsing kapa diketsahalong tse fapaneng tse amanang le S&T, kaha ho etsa jwalo ho sebetse e le sesupo sa boitshwaro ba bona malebana le saense. Diketso kapa diketsahalo di ne di arotswe ka mefuta e mehlano e pharaletseng ya dipuisano: dipuisano tsa thuto, dipuisano tse thehilweng ho Kgohele, dipuisano tsa Sechaba sa lehae, dipuisano tsa ho arolelana ditaba, le dipuisano tsa botho le disebediswa tsa inthanete



DIPUISANO TSA THUTO:

Boemo ba pepeseo ho thuto ya saense le dipalo sekolong se phahameng sa sekondari (Di-grade tsa 10–12).



DIPUISANO TSE THEHILWENG HO KGOHELO:

Ho fumaneha le ho ba teng dibakeng tsa S&T, mesebetsi kapa diketsahalo.



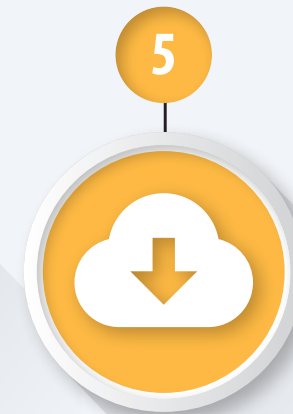
DIPUISANO TSA SECHABA:

Ho kenya letsoho mesebetsing ya saense bakeng sa ntlafatso ya Sechaba.



DIPUISANO TSA HO AROLELANA DITABA:

Mekgwa yah o arolelana ditaba tsa S&T har'a Sechaba.



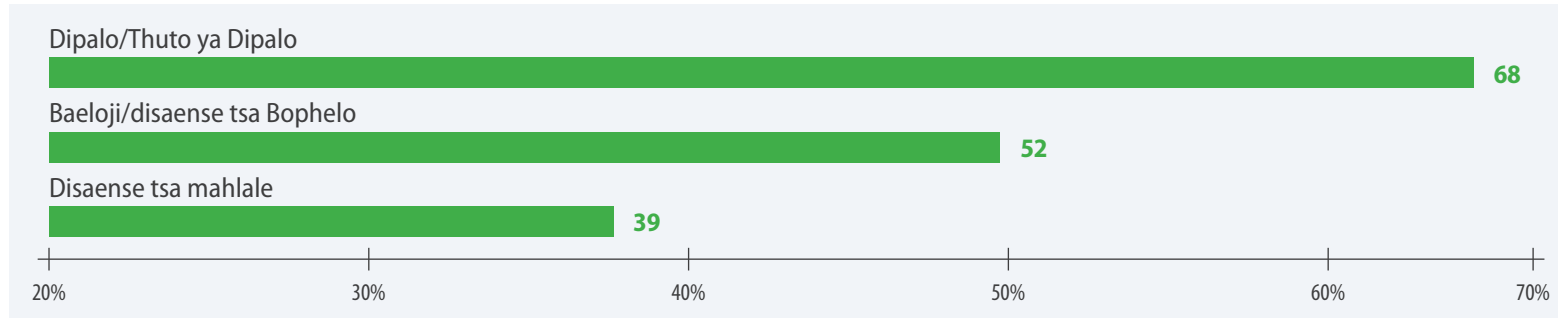
DIPUISANO TSA BATHO MABAPI LE DI-APP TSA MARANG-RANG:

Mekgwa ya tsehbediso ya di app tsa marang-rang.

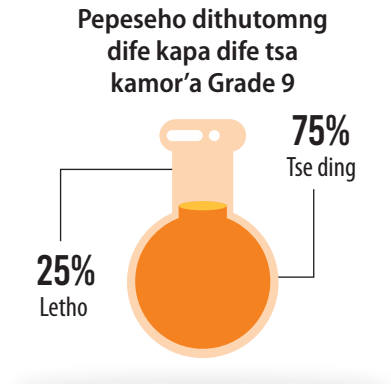
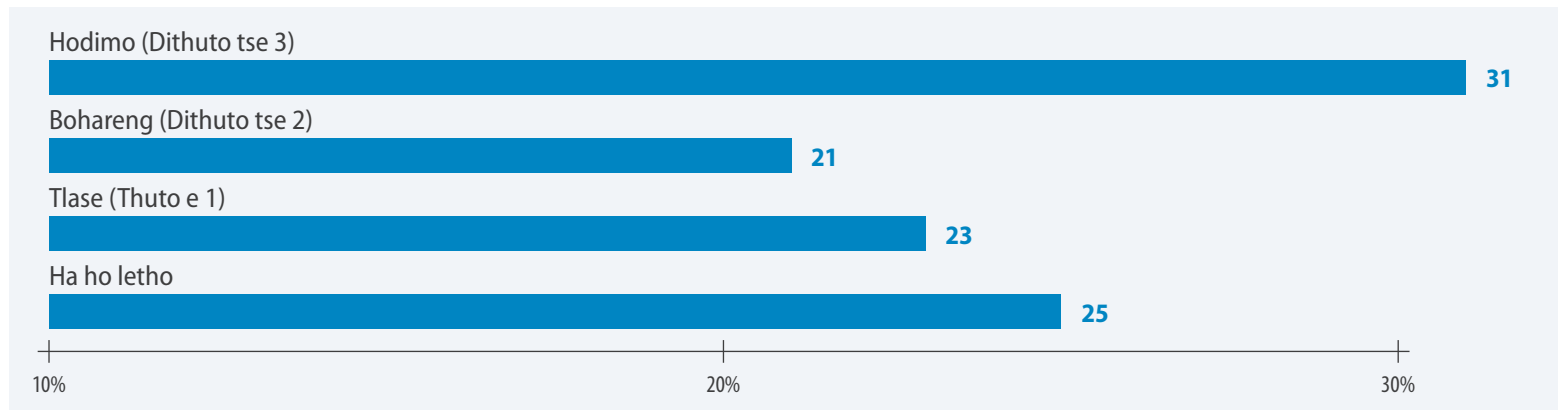
10.1 Dipuisano tsa thuto: Boemo ba pepeseho dithutong tsa STEM sekolong

Tsebo ya saense le maikutlo mabapi le saense di ya amana. Ba arabetseng phuputsong ya SAPRS ba tlalehile ka dithuto tsa STEM tseo ba di kgethileng hore ba ithute sekolong tsa Grade 9.

Pepeseho dithutong tsa STEM kamor'a Grade 9 (%)



Index ya pepeseho ya STEM (%)



Ba 3 ho batho ba baholo ba 10 ba

ne ba na le pepeso e hodimo ya STEM, ban ka dithuto tsohle tse tharo tsa STEM tseo ho botswang ka tsona kamor'a Grade 9







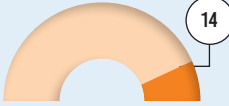










Banang le ponahalo e hodimo ya STEM:

- O bile le maemo a hodimo a boiphihlelo ba thuto le tshehetso e hodimo ya thuto ya lehae,
- O tswa malapeng a phahameng a SES,
- E ne le ba banyane, baithuti, barutwana, le ba sebetsang, le
- E ne le bao ho ka etsahalang hore ebe ke Makgowa a bath oba baholo.

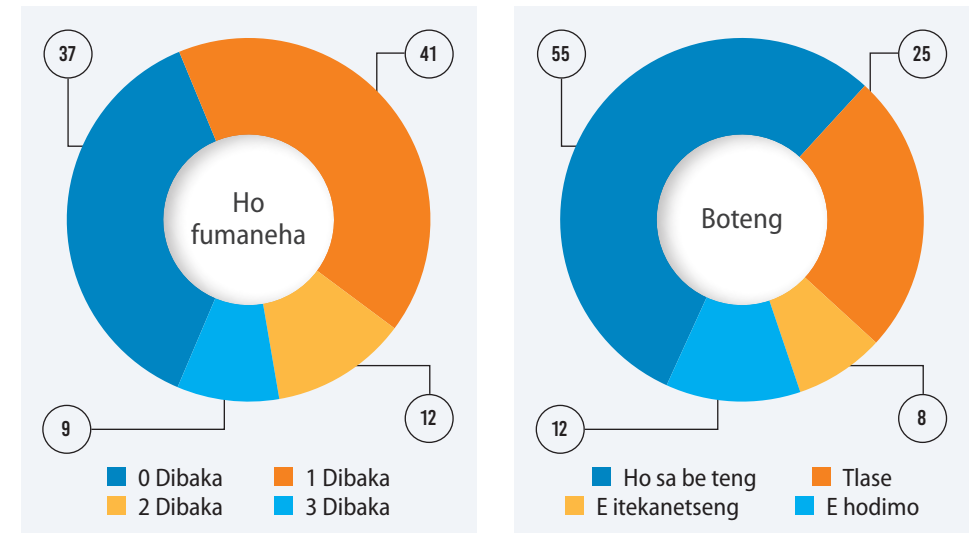
10.2 Dipuisano tse thehilweng mabapi le Kgohele: Boteng ba le ho ba teng dibakeng tsa S&T

Ba arabetseng diphuputsong tsa SAPRS ba tlalehile ka boteng ba dibaka tsa S&T le mesebetsi dibakeng tsa bona le hore na ba kile ba di etela. Ke karolo e ka hodimo ho karolo ya boraro ya Sechaba (37%) e ne e se na dibaka tsa S&T, jwaloka dilaeborari, dimusiamo kapa ditsi tsa S&T haufi le mahae a bona, athe ba fetang halofo (55%) ba ne ba so ka ba ya dibakeng kapa diketsahalong tsa S&T.

Boteng ba le ketelo ya dibaka tsa S&T le diketsahalo (%)

	Dibaka tsa S&T le diketsahalo	E fumaneha sebakeng	E bile teng
	Laeborari ya Sechaba	 55	 30
	Diketsahalo tsa saense tsa Sechaba mohlala, ho hlwekisa, hot samaya ho bona tlholeho	 14	 18
	Dimusiamo	 12	 23
	Serapa sa dimela, tlholeho kapa ditsi tsa tlholeho, dits tsa diphoofolo tse hlaha, ditsi tsa polokeho ya tsa metsi	 10	 26
	Setsi sa Saense le Theknoloji kapa ponaletso	 7	 16

Boteng ba le ketelo ya dibaka tsa S&T le diketsahalo (%)

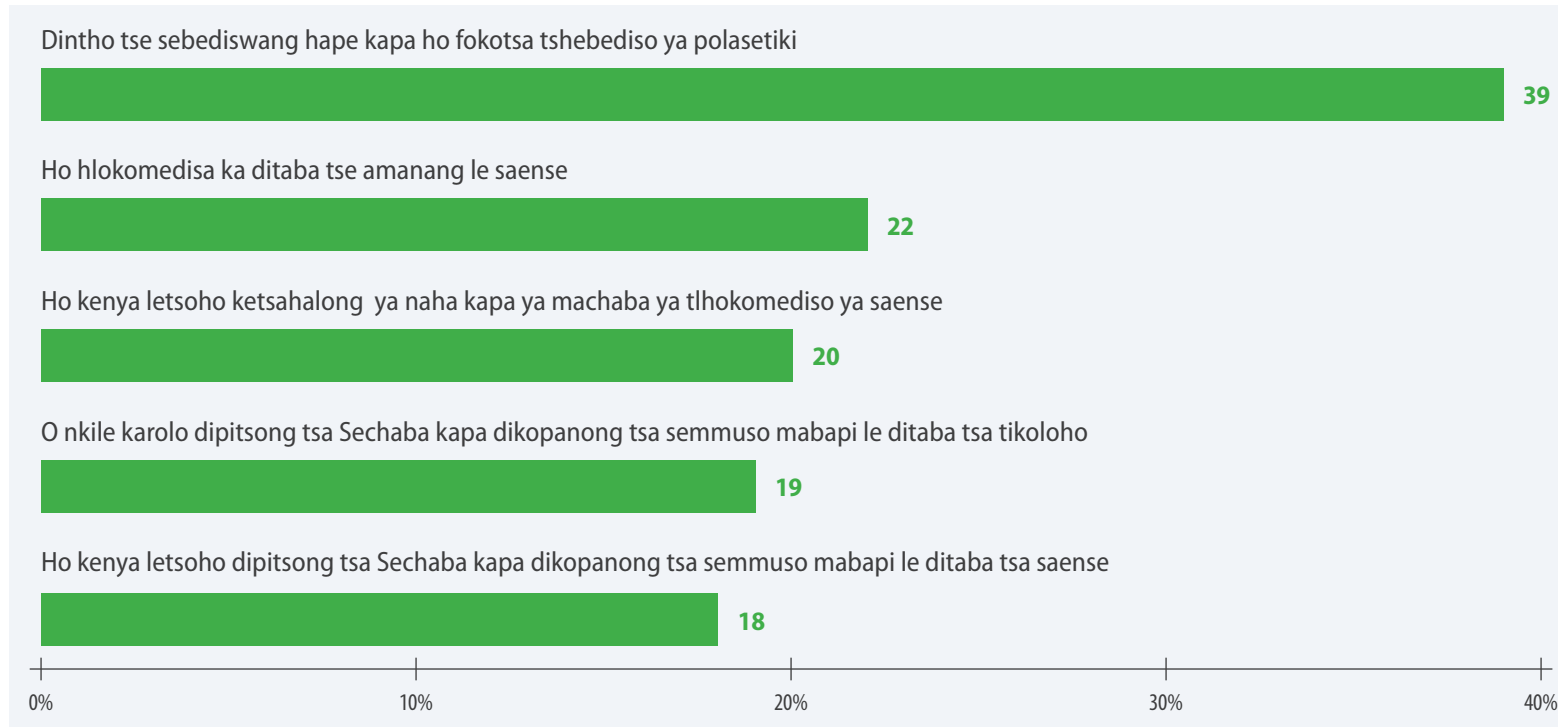


Ba nang le monyetla wa ho ba teng diketsahalong le mesebetsing ya S&T:

- Ba na le boiphihlelo ba thuto ya materiki le hofeta, le tshehetso e hodimo ya thuto ya lapeng,
- Ba tswa malapeng a phahameng a SES,
- Ba dula metseng ya ditoropo le dibakeng tse sa rerwang,
- Ba sebetsa, baithuti, le barutwana,
- Ba phela haufi le dibaka tsa S&T, mme ba na le pepeseho ya ho sebedisa ditaba tse ding tsa S&T.

10.3 Dipuisano tsa mabapi le Sechaba sa lehae

Ba nkile karolo dipuisanong tsa saense tse mabapi le Sechaba sa lehae (% bonyane ka dinako)



Ke bo mang ba bileng le seabo se seholo dipuisanong tsa Sechaba?

- Phapang ka kakaretso ya dintlha, ka dihlotshwana, e ne e tloha ho 8 ho isa ho 33.
- Ba nang le monyetla o moholo wa ho ba le seabo dipuisanong tsa saense ya Sechaba ke:
 - Ba baholo ba atlehileng thutong ya materiki ho ya hodimo,
 - Ba hirilweng, baithuti, le barutwana, le
 - Ba dulang metseng ya ditoropo le dibakeng tse sa rerwang.

Motho a le 1 ho ba 7 o

tlalehile hore mesebetsi ya saense ya Sechaba e kang ya ho hlwekisa sechabeng le maeto a tlhohleho a ne a le teng sebakeng



Motho a moholo a le 1 ho ba 10 o

ne a atisa ho nka karolo mesebetsing ya sechaba



MOSEBETSI O TLWAELEHILENG HAHOLO

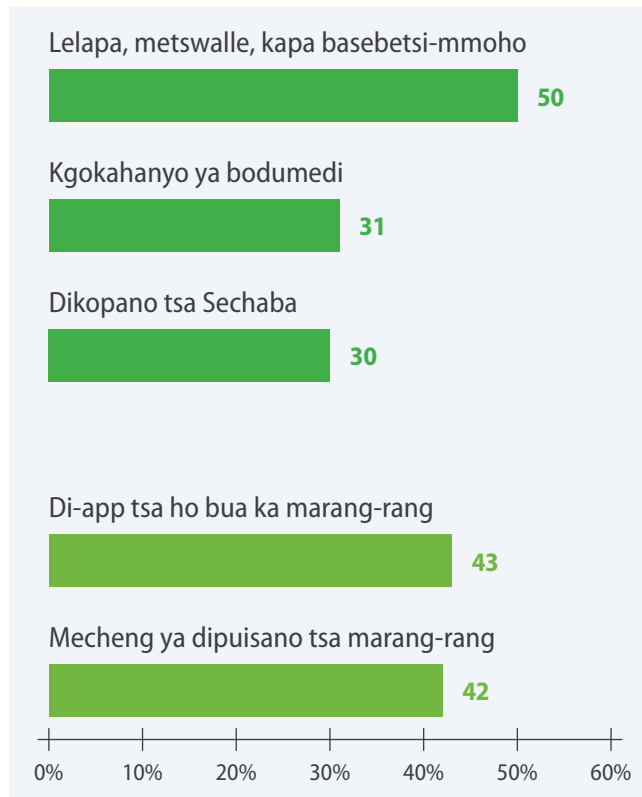
Ho tsosolosa disebediswa kapa ho fokotsa tshebediso ya polasetiki



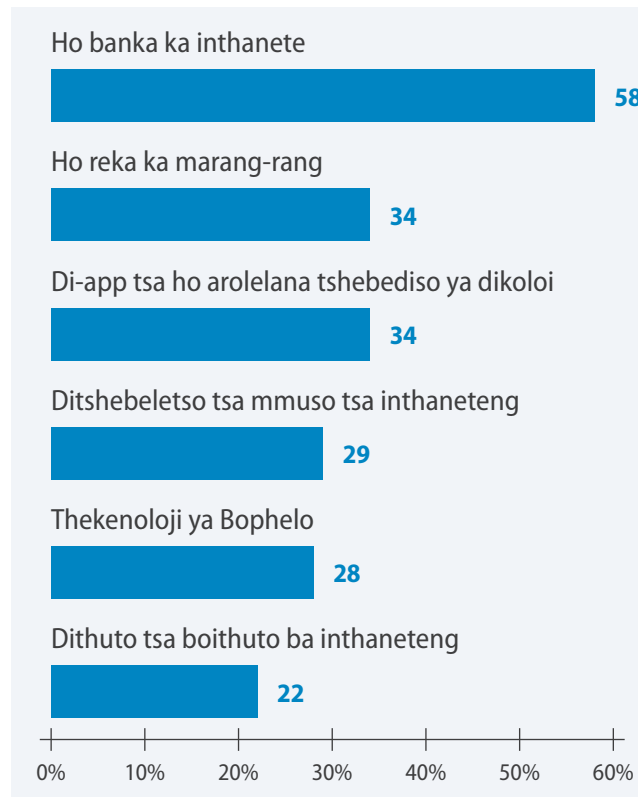
10.4 Dipuisano tsa ho arolelana ditaba le dipuisano tsa tshebedisop ya di-App tsa marang-rang

Ho tlatselisa ho fumaneng ditaba tsa S&T, Sechaba se arolelane ditaba, mmoho le ho sebedisa di-app tsa marang-rang. Ho ne ho na le maemo a tlase a ho arolelana ditaba, hammoho le tshebediso ya di-app tsa marang-rang har'a Sechaba. Sechaba se arolelane ditaba tsa S&T hangata le ba lelapa, metswalle, kapa besebetsi-'moho; mme sesebediswa sa marang-rang se sebediswang hangata e ne e le ho banka ka inthanete.

Ho arolelana ditaba; jwang le hore le mang (% bonyane ka dinako tse ding)



Tshebediso ya di-app tse khetheileng tsa marang-rang (% bonyane ka dinako)



Batho ba baholo ba 2 ho ba 10 ba arolelane ditaba mme ba sebedisa ditshebeletso tsa di-app tsa marang-rang



- Ho bile le phapang e pharaletseng ya dintlha, ka dihlotshwana tse nyane, bakeng sa karolelano ya ditaba ho tloha ho 18 ho isa ho 46, le tshebediso ya ditshebeletso tsa inthanete ho tloha ho 11 ho isa ho 56, ka bobedi ho tse 100.
- Ba arolelaneng ditaba mme ba tleleha tshebediso e hodimo ya di-app tsa marang-rang ba ne ba ka nna ba:
 - Ba le boiphihlelo bo hodimo ba thuto le tshetso e kgolo ya thuto ya lapeng,
 - Ba ba le SES e phahameng,
 - Ba banyane, ba hirilwe, baithuti, le barutwana, le hore
 - Ba phela dibakeng tsa ditoropo tse rerilweng le tse sa rerwang.
- Batho ba baholo ba MaAfrika a matsho ba ne ba na le monyetla wa ho arolelana ditaba, athe batho ba baholo ba Malindia/MaAsia le magkgowa ba ne ba atisa ho tleleha tshebediso e hodimo ya di-app tse kgethehileng tsa marang-rang.

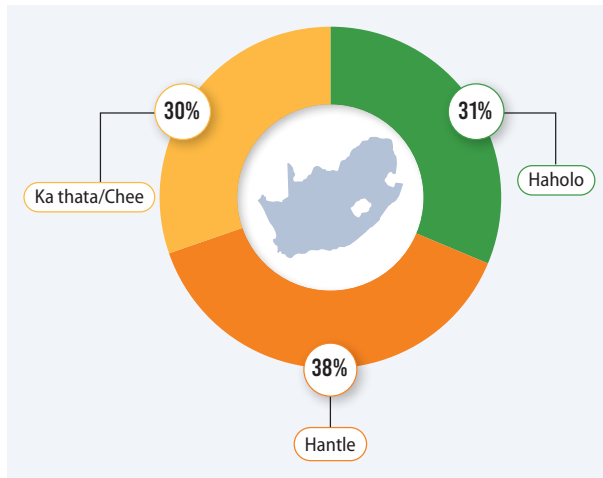
11

Maikutlo a motlotlo, Tshepiso, le dintlha tsa bohlokwa mabapi le tsamaiso yan aha ya mekgwa ya Sechaba

11.1 Thoriso ka dikatleho tsa S&T tsa Afrika Borwa

Sechaba se tsebang ka saense se tshehetswa ke ditekanyetso tse amohelehang le ho ananela tsamaiso ya naha ya boqapi. Leha batho ba baholo ba 7 ho ba 10 ba ne ba le motlotlo 'haholo' kapa 'hantle' ka dikatleho tsa S&T tsa Afrika Borwa, ba ne ba na le bonnete ka dikatleho tseo ha di bapiswa le dibaka tse ding tsa lefatshe, ka kotare e nwe feela e dumelang hore Afrika Borwa e betere ho feta Europe le Amerika Leboya.

O motlotlo hakae ka ditlaleho tsa S&T tsa Afrika Borwa (%)?



Dikatleho tsa S&T tsa Afrika Borwa ha di bapiswa le dibaka tse ding tsa lefatshe di jwang

Afrika borwa e betere ho feta ...		Peresente e dumelang
	Dikarolo tse ding tsa Afrika	67%
	Yuropa le Amerika Leboya	25%
	Dinaha tsa Asia	18%

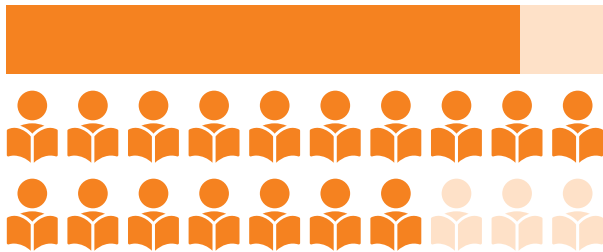
- Kakaretso ya dintlha, ho ya ka dihlotshwana, di ne di fapane ka sebaka se tlase le se patisaneng dipakeng tsa 24 le 40 lekgolong bakeng sa motlotlo o hodimo, le pakeng tsa 30 le 42 lekgolong ho ba neng ba bona dikatleho tsa Afrika Borwa di le betere ho feta tsa dibakeng tse ding kaofela. Sena se bolela hore ma Afrika Borwa a na le tshekamelo yah o ba le moya o tshwanang ka bophara wa boithoriso ka dikatleho tsa S&T, ho sa tsotellehe dimelo tsa bona tse fapaneng.
- Ba tlalehileng motlotlo o hodimo ka dikatleho tsa S&T e ne e le batho ba baholo ba MaAfrika a matsho, ba nang le boiphihlelo bo boholo ba thuto, ba fumaneng tshehetso e hodimo ya thuto ya lapeng, le baithuti le barutwana.
- Ba neng ba bona dikatleho tsa Afrika Borwa tsa S&T di le betere ho feta tsa ba dinaha tse ding e ne e le MaAfrika a matsho a batho ba baholo, ba nang le boiphihlelo bo tlase ba thuto, le maemo a hodimo a tshehetso ya thuto ya lapeng, le ba dulang dibakeng tse ditoropong tse sa rerwang.
- Ka lehlakoreng le leng, ba neng ba bona dikatleho tsa Afrika Borwa tsa S&T di se betere ho feta dikatleho tsa dinaha tse ding e ne e le Malndia/MaAsia le Makgowa a maholo, ba nang le thuto e phahameng, le ba phelang dibakeng tsa mahae a SES a ruileng.

11.2 Tshepiso ya ditsebo tsa S&T bakeng sa bacha

Sechaba se ile sa beha Tshepiso ya ditsebo tsa S&T ho bacha haholo. Sena se romela molaetsa o hantle ho bacha mabapi le bohlokwa le boleng ba ditsebo tsa S&T.

Bacha ba lokela ho kgothaletswa
ho ithuta ka S&T

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S&T e lokisetsa bacha ho arabela diqholotso
dibakeng tseo ba phelang ho tsona

76

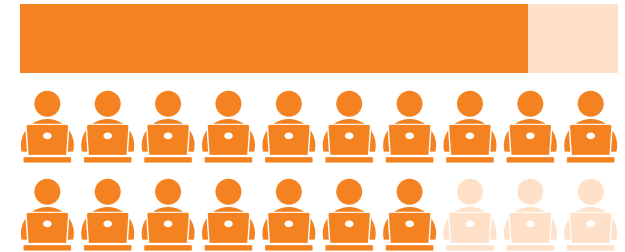


Ditshobotsi tsa ba faneng ka dintlha tse kgolo tsa Tshepiso ya bokgoni ba S&T

- Ma Afrika Borwa a na le tshekamelo yah o amohela pono e ntle ka bophara ya Tshepiso ya ditsebo tsa S&T bakeng sa bacha, ho sa natswe dimelo tse fapaneng tsa bona.
- Ba amohetseng Tshepiso e hodimo ya S&T ba ne ba na le:
 - Ho feta thuto ya mathomo,
 - Le tshehetso ya thuto e hodimo ya lapeng.

Tsebo ya dijithale le khomputha
e ntse e ba bohlokwa ho bacha

85



Lengolo la thuto la S&T le fa bacha menyetla e
mengata ya mesebetsi ho feta mangolo a mang

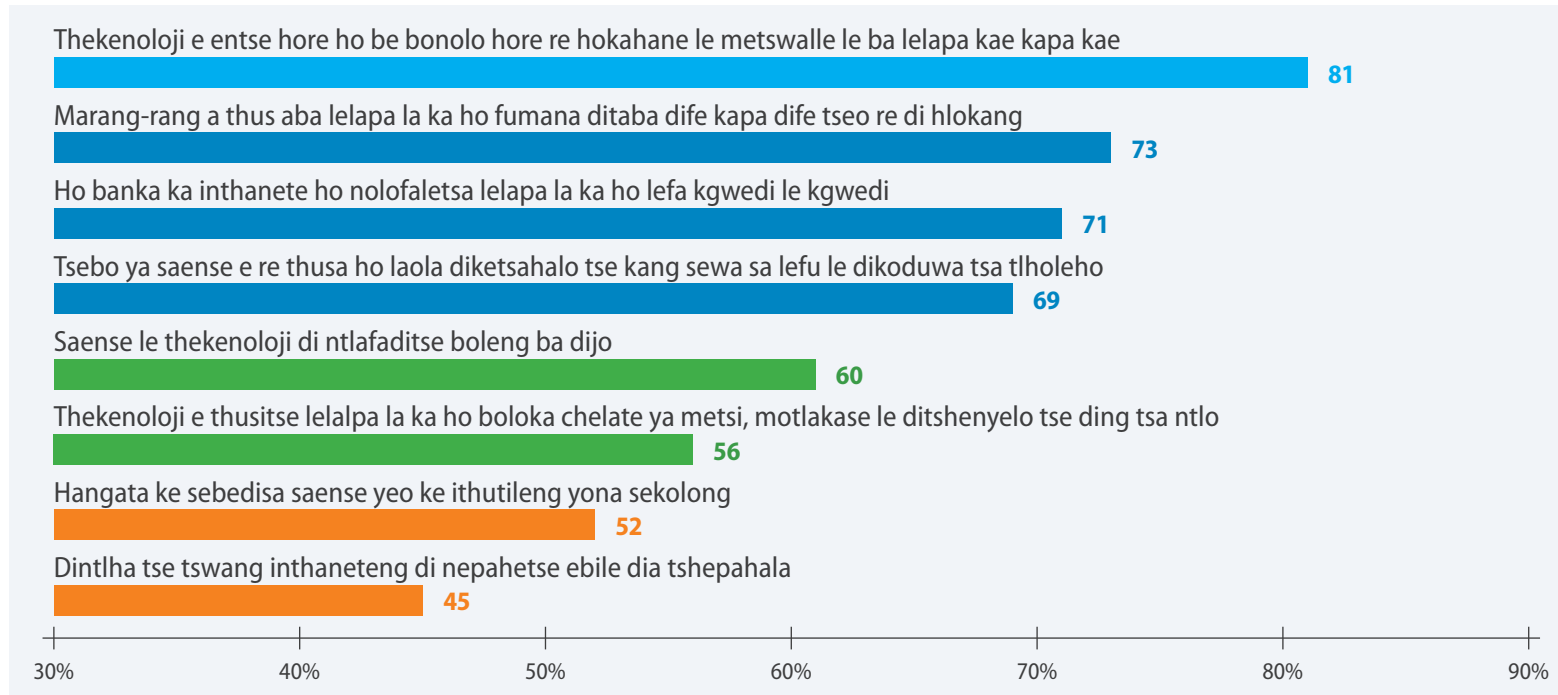
76



11.3 Boleng ba boiphihlelo ba S&T bophelong ba letsatsi le letsatsi

Ho ka etsahala hore re nke ntho e le ya bohlokwa haeba re e nka e le ya bohlokwa bophelong ba rona ka kotloloho.

Boleng ba dipihlelo tsa S&T bophelong ba letsatsi le letsatsi (peresente ya tumellano)



BOEMO BO HODIMO-DIMO BA TUMELLANO

Khokahano e bonolo lipakeng tsa lelapa le metsoalle e khotalletsoang ke theknoloji

81%



BOEMO BO TLAASE HAHOLO BA TUMELLANO

Ho nepahala le ho tshepahalana hwa inthanete

45%



Batho ba baholo ba 6 ho ba 10 ba

anananela S&T bakeng sa boleng bo ntlafatseng ba dijo



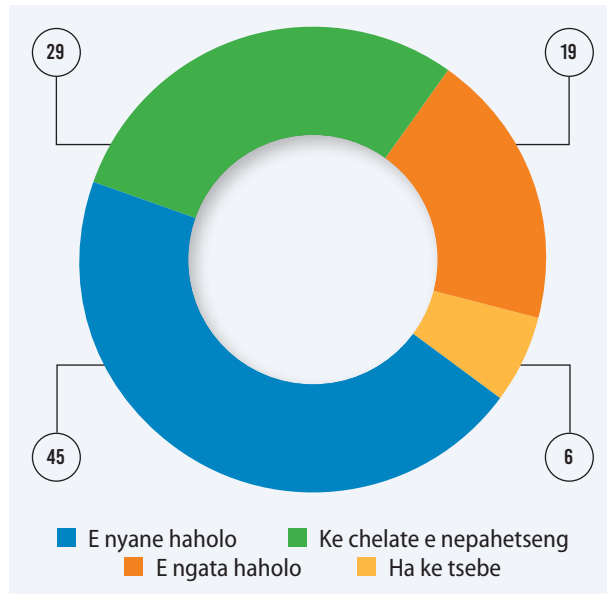
Ke mang ya ananetseng dipihlelo tsa S&T haholo?

- Batho ba baholo ba robedi ho ba bang le ba bang ba 10 ba ne ba ananela S&T bakeng sa bokgoni bah o hokahana le ba lelapa le metswalle, ha ba supileng ho ba 10 ba ne ba ananela bohokwa ba S&T bakeng sa tsebo e fanweng le thuso e hlakileng maphelong a bona a letsatsi le letsatso.
- Ke batho ba ka tlase ho halofo ya Sechaba ba dumetseng hore ditaba tse tswang inthaneteng di nepahetse ebile dia tshepahalana.
- Ba neng ba ananela S&T ba na le boiphihlelo haholo:
 - Ba na le tshehetso e fetang tshuto ya mathomo le tshehetso ya thuto e hodimo ya lapeng,
 - Ba ne ba le banyane, baithuti, le barutwana, le hore
 - Ba bontshitse tsebo e hodimo ya, le thahasello ho S&T.

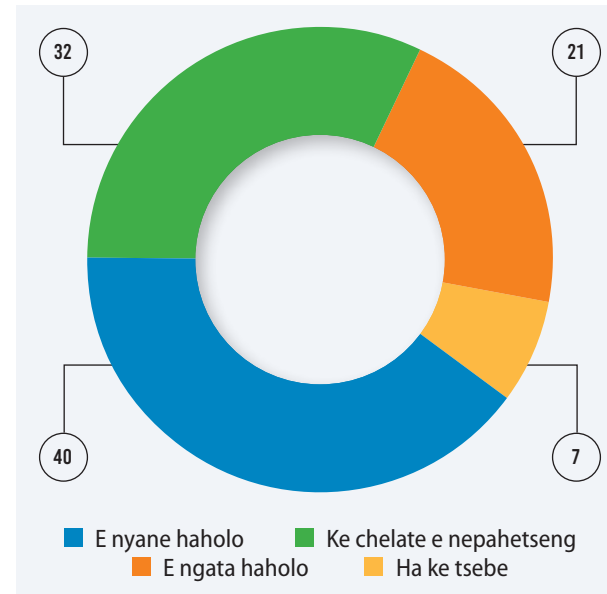
11.4 Tshehetso ya Sechaba bakeng sa tshebediso ya chelete ya R&D bakeng sa saense le thekenoloji

Maikutlo a Sechaba malebana le matsete dipatlisisong le ntshetsopele (R&D) a bontsha mmuso ha tekanyetso ya dichelete e ka ajwa jwang. Sechaba se ne se na le maikutlo a hore tshebediso ya chelete hajwale yam muso le dikgwebo tse kgolo ho R&D ya S&T e lokela ho bolokwa kapo ho eketswa.

Tshebediso ya chelate yam muso ho R&D (%)



Tshebediso ya chelate ya dikgwebo ho R&D (%)



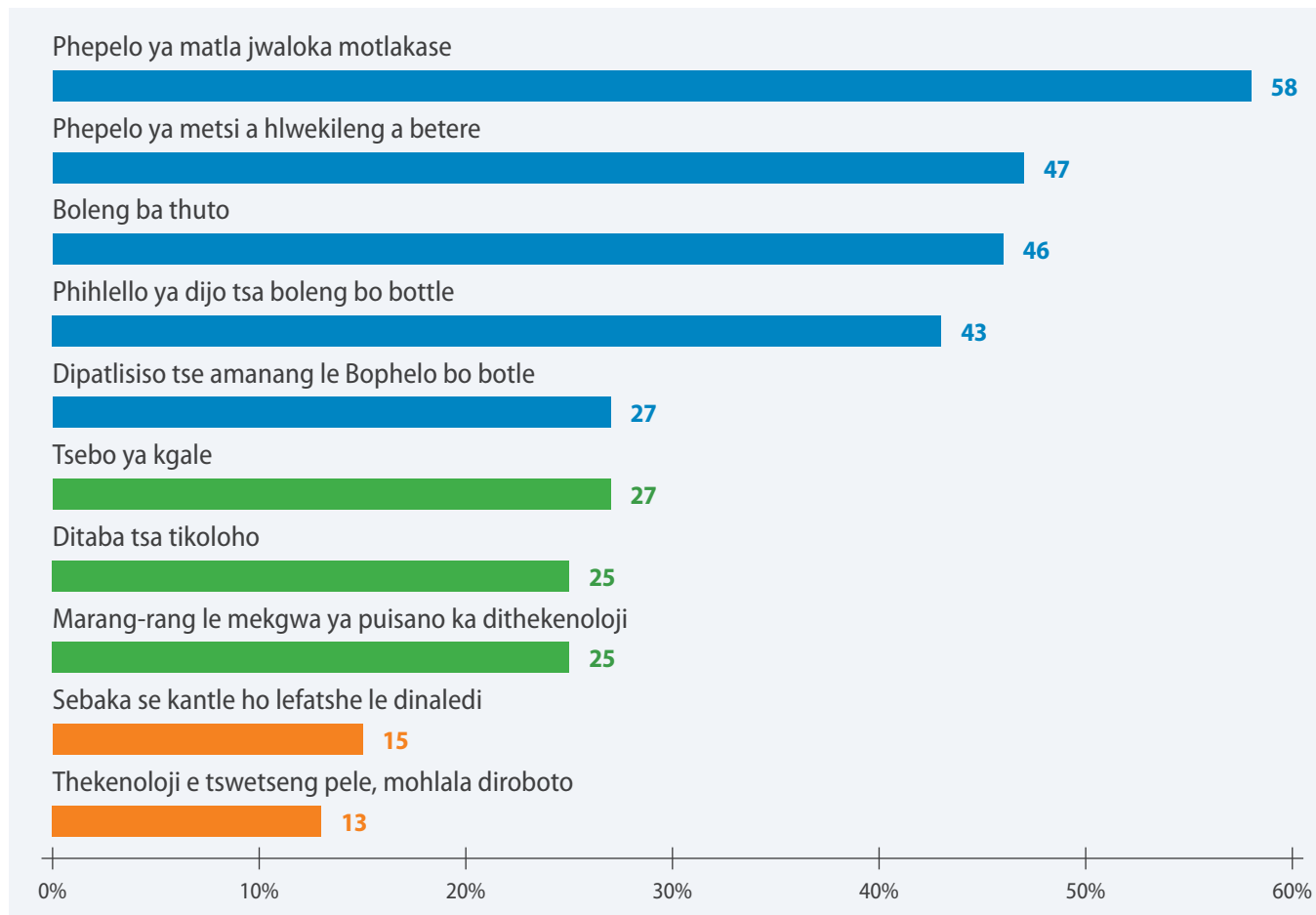
Ditshobotsi tsa ba amehileng haholo ka hore tshebediso ya chelate ho R&D e ne le tlase haholo

- Tshehetso bakeng sa tshebediso ya chelete yam muso ya R&D ho S&T e bile le phapang e pharaletseng ya dintlha, ka dihlotshwana, e tloha ho 31 ho isa ho 68 ho tse 100. Sena se bontsha maikutlo a fapaneng har'a Sechaba.
- Ba neng ba amehile haholo ka hore maemo a hajwale a bofani ba R&D a tlase haholo e ne e le:
 - Ba nang le mangolo a thuto e phahameng,
 - Bao e leng ba di-quintile tse ruileng ka ho fetisisa tsa SES, le
 - Batho ba baholo ba Makgowa, ba mmala o tswakileng, MaIndia/MaAsia.

11.5 Dintlha tsa bohlokwa tsa dipatlisiso tsa S&T bakeng sa Afrika Borwa

Ho tswa lethathamong la dihloho tse kgethilweng tsa S&T, Sechaba se kgethile dibaka tse nne tsa dipatlisiso tseo ba nahanang hore mmuso o lokela ho tswela pele ho di tshheheta ka dichelete. Mekgahlelo o kgethehileng ka ho fetisisa ke tse amanang le phepelo ya matla, phepelo ya metsi, thuto ya boleng bo hodimo; ha dintho tse tlang kgethilweng ka tlase e le sepaka-paka le dinaledi, le thekenoloji e tswetseng pele, jwaloka diroboto.

Dintlha tsa bohlokwa tsa dipatlisiso tsa Afrika Borwa bakeng sa dichelete tsa bofani ba dipatlisiso tsa Nakong e tlang (%)



BOHLOKWA BO PHAHAMENG KA HO FETISISA

Phepelo ya matla

58%



BOHLOKWA BO TLASE KA HO FETISISA

Thekenoloji e tswetseng pele, jwaloka diroboto

13%



- Dintlha tse ka sehlohong tse hlano tsa dipatlisiso bakeng sa bofani ba chelete ba kamoso (bara e putswa), tse kgethilweng ke Sechaba di nkwa e le 'tse potlakileng le tsa bohlokwa. Di emela diphephetso tsa sejwale-jwale tsa Sechaba, tseo ditlamorao tsa tsona e leng karolo ya boiphihlelo ba letsatsi le letsatsi ba Sechaba.
- Sehlopha sa bobedi sa dintho tse ka sehlohong (bara tse tala) di ka arolwa di le "bohlokwa, empa di sa potlaka'.
- Sehlopha sa boraro sa dintho tse ka sehlohong se nnang sa wela sehlopheng sa dipatlisiso tsa 'lehodimo le leputswa', moo dikopo tsa Sebele tsa lefatshe di sa hlokalang hang-hang ho Sechaba.

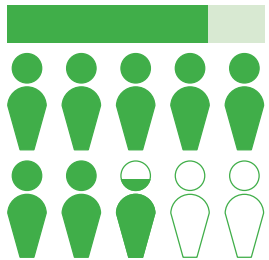
12 Letshwao la dikamano tsa Sechaba sa Afrika Borwa le saense

Bakeng sa e nngwe le e nngwe ya matshwao a 27 a kgethilweng, re sebeditse hore (i) kakaretso ya dintlha (ho 100), le (ii) phapang ya dintlha, ka ho ba le phapang pakeng tsa kakaretso ya dintlha e hodimo le e tlase har'a dihlothswana tse fapaneng.

DINTLHA-KAKARETSO TSE HODIMO KA HO FETISISA E NE E LE TSA MEHATO YA:

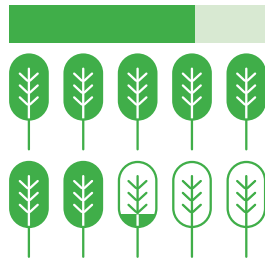
Tšepiso ya ditsebo tsa S&T bakeng sa bacha

78



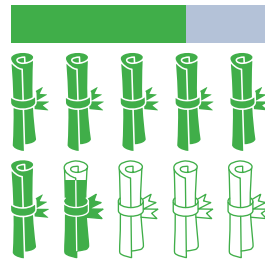
Ho ameha ka tikoloho

72



Tšepo ho ditaba tsa S&T tse tswang diUnivesithing

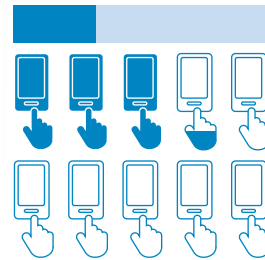
68



DINTLHA-KAKARETSO TSE TLASE KA HO FETISISA E NE E LE TSA MEHATO YA:

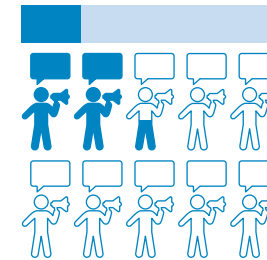
Tšhebediso ya di app tsa marang-rang

32



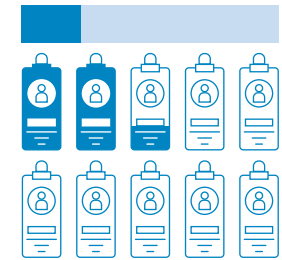
Dipuisano tsa Sechaba

23



Boteng dibakeng tsa kgahleho

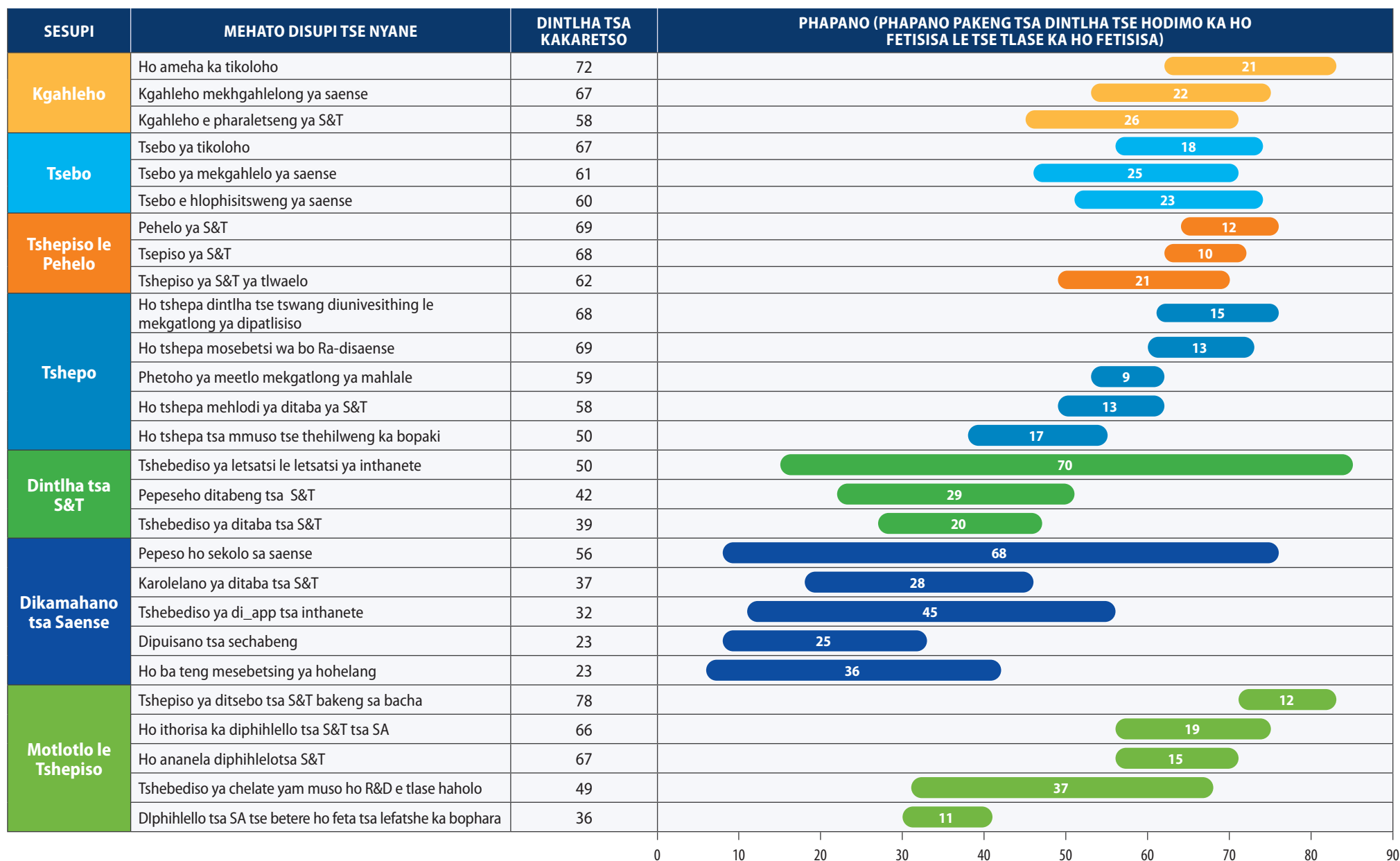
23



Ka lehlakoreng le leng, kabo ea dintlha e ne e phahame ka ho fetisisa bakeng sa tšhebediso ea letsatsi le letsatsi ea inthanete (70) le ho pepeseha dithuto tsa sekolo tsa STEM (68); 'me e ne e le tlase haholo bakeng sa maikutlo a mehato ea ts'epo, tšepiso, le mekhoha ea poloko. Phapang e fokolang ea dintlha, yeo re e bitsitseng e le mehato e leka-lekaneng, e fana ka maikutlo a hore maikutlo a sechaba a tshwana, ho sa natswe phapang ea sechaba le palo ea batho. Phapang e pharaletseng ea dintlha, e bitsoang mehato e fapaneng, e bontsha ho se lekane ka lebaka la phapang ea sechaba le palo ea batho ba baholo.

Kamor'a moo re ile ra theha "matshwao" ikgethileng bakeng sa dikamano tsa Sechaba sa Afrika Borwa le saense ka ho rala palohare ya dintlha, hammoho le phapang ya dintlha bakeng sa mehato e meng le e meng, e leng se tshwarang ka tsela e bonolo ho fapana ha mehato ya tsebo ya rona ya saense, maikutlo, le dikgokahanyo.

12.1 Tsebo ya saense, maikutlo le matshwao a dipuisano, phapang ya dintlha



12.2 Ho arola mehato ka mefuta e mene

Ho utlwisisa betere diphapano tsa dikamano tsa Sechaba le saense, re sebedisitse kakaretso ya dintlha le phapahang ya dintlha bakeng sa mohato o mong le o mong. Re thehile mekgahlelo ya dintlha tse hodimo le tse tlase (re sebedisa palo e tlwaelehileng ya dintlha tse 50 jwaloka sebaka kgaotsweng), mme se sephira (kapa se fapaneng), le mefuta e fapaneng ya dintlha (kapa e lekanang) (re sebedisa phapang ya 20 jwaloka sebaka se kgaotsweng). Re thehile mekgahlelo e mene.

MAIKUTLO A EGALITARIAN KA DINTLHA TSE HODIMO TSA KAKARETSO

- Ho ananela diphihlelota S&T
- Ho ithorisa ka diphihlello tsa S&T tsa SA
- Tshepiso ya ditsebo tsa S&T bakeng sa bacha
- Tsepiso ya S&T
- Pehelo ya S&T
- Ho tshepa mosebetsi wa bo Ra-disaense
- Ho tshepa dintlha tse tswang diunivesithing le mekgatlong ya dipatlisiso
- Ho tshepa mehlodi ya ditaba ya S&T
- Phetoho ya meetlo mekgatlong ya mahlale

MAIKUTLO A FAPANENG LE DINTLHA TSE HODIMO TSA KAKARETSO

- Tsebo ya mekgahlelo ya saense
- Tsebo e hlophisitsweng ya saense
- Pepeso ho sekolo sa saense
- Tsebo ya tikoloho
- Ho ameha ka tikoloho
- Kgahleho e pharaletseng ya S&T
- Khahleho libakeng tse khethehileng tsa S&T
- Tshepiso ya S&T ya tlwaelo

MEHATO E FAPANENG E NA LE DINTLHA TSA KAKARETSO TSE TLASE

- Tshebediso ya letsatsi le letsatsi ya inthanete
- Tshebediso ya di_app tsa inthanete
- Pepeseho ditabeng tsa S&T
- Tshebediso ya ditaba tsa S&T
- Dipuisano tse thehilweng ho kgohelo
- Karolelano ya ditaba tsa S&T
- Tshebediso ya chelate yam muso ho R&D e tlase haholo

MEHATO YA EGALITARIAN KA DINTLHA TSA KAKARETSO TSE NYANE

- Diphihlello tsa SA tse betere ho feta tsa lefatshe ka bophara
- Ho tshepa tsa mmuso tse thehilweng ka bopaki



13 Diphetho tsa ho ntlafatsa dikamano tsa Sechaba le saense Afrika Borwa



1

TSAMAISO YA SAENSE TSHWANETSE HO AMOHELA PARAGIGM YA SAENSE LE SESOTHO

Thuto ya hona jwale, hammoho le mokgwa wa DSI wa lenaneo la ho kopanela saense, di fumaneha kahar'a paradigm ya saense-ya-sechaba e amohelang mokgwa wa tsamaiso ka bobedi le wa puisano ka dikamano pakeng tsa saense le Sechaba, hammoho le mesebetsi ya batho ka bomong le mekgatlo.



2

RE TSHWANETSE HO FETOLA TLALEHO E MABAPI LE KAMOO RE HLAHANGLE HO HLALOSA SECHABA SA AFRIKA BORWA

Maikutlo a maAfrika Borwa a nahanela, a shejwa, a na le tekano, mme a bontsha tlhokomediso ya dintlafatso tsa S&T. Hoo e ka bang halofo ya mehato e hlahlobilweng, Sechaba se bontshitse maikutlo a tshwanang ho sa tsotellehe maemo a bona a bochaba. Bakeng sa mehato e meng ho ne ho na le phapang pakeng tsa dikarabo tsa Sechaba.



3

U KA SE FOSE KA HO NTLAFATSA TSEBO YA SAENSE

Mananeo a tlhokomediso ya saense a lokela ho fanwa ka diforomo tse ngata tsa kgale le tsa Sechaba, e kenyelletse saense yeo e leng karolo ya boiphihlelo ba batho kahar'a phatlalatso ya Sechaba.

**4****EKETSA THAHASELLO HO S&T LE HO AHA SECHABA SE UTLWISISANG MOETLO WA SAENSE**

Sekala le phihlello ya mananeo a hona jwale a boikopanyo ba saense a tlameha ho atoloswa, mme mananeo a macha a nang le ditaba tse amehangle tse hohelang a lokela ho qadiswa le ho phatlalatswa ka mecha e fapaneng. Mananeo a lokela ho ikemisetsa ho kenya moetlo wa ho batla tsebo ka saense le dipatlisiso sechabeng.

**5****TSEBO KA, THAHASELLO, LE HO AMEHA KA S&T DI AMANA KA MATLA**

Tsepamiso ho maikutlo a thahasello a ka ba bonolo haholwanyane ho kena dipakeng. Sena se na le monyetla wa ho theha sakelem ya nnete mme se na le melemo le tshepo mehatong e meng e hlahlojwang thutong ena, jwaloka tsebo le kameho.

**6****TSHEBEDISO YA THUTO YA LAPENG LE DITABA TSA BOIKOPANYO**

Hará tlhahobo yohle, sesupo se hlahelletseng e ne e le sthehetso ya thuto ya lapeng ka mokgwa wa ho kgothaletsa hob ala, ho ngola mosebetsi wa sekolo, le puisano ka ditaba, hammoho le h oho sebetsa hantle le ho nka dithuto tsa saense sekolong. Tshehetso ya thuto ya lehae e bonthsa bohlokwa ba ho ba le thahasello le aha tsebo.

**7****MAIKUTLO MABAPI LE TSHEPISO YA, HAMMOHO LE BOITHORISO LE HO TSHEPA S&T KE MOKGWA WA EGALITARIAN KA SEMELO**

Ho kopanya le ho haha ho feta hodim'a maikutlo eana ho hloka ho netefatswa ha tsamaiso ya moetlo e anelang, e keteka, le ho kgothaletsa S&T. Re lokela ho theha maemo a setso a bontshang ditshebeletso tsaho etsa diqeto tse thehilweng bopaking, dipuisano, ho nhyatala le ho phehisana ka maikutlo.

**8**

MAEMO A TSEBO LE HO FINYELLA HA SAENSE, HO FIHLELLA MMOHO LE TSHEBEDISO YA DITABA TSA S&T DI PHARALLETSE KA TLHOLEHO

Ditshobotsi tsa mantlha tse tsebisang phapano ena ke boiphihlelo ba thuto, boemo ba moruo sechabeng, le ho ba moithuti kapa morutwana. Puisano e ntseng e eketseha ya saense le dipuisano ka mecha e mengata, ho tloha ho porinta ho fihla ho phatlalatsa ka marang-rang, e lokela ho kgothaletswa le ho laelwa.

**9**

KEKETSO YA HO FIHLELA DITABA TSA S&T

Dikotara tse tharo tsa Sechaba di na phihlelo ya inthanete. Sechaba se tshepa ditaba tsa S&T tse hlahiswang ke thefeshini le seya-le-moya empa se hlokolosi ka ditaba tsa S&T mecheng ya ditaba tsa Sechaba. Ditaba tsa S&T di lokela ho phatlalatswa ka mekgwa e utlwisisehang, haolo-holo telefishini le seya-le-moya.

**10**

DIPHAPANG TSE KGOLO TSA BOITSHWARO BA DIKGOKAHANYO TSA SAENSE DI SA TSWELAPELE MPA DI KA TSHUSUMETSWA KA HO LOKA KA HO KGOThALETSA TSEBO YA SAENSE LE THAHASELLO LE HO HLOLA DITSHITISO TSA PHIHLELLO

Ka kakaretso, maemo a tlase a dikgokahanyo tsa saense a ne a bonwa har'a mekgwa yohle ya kgokahanyo. Mananeo a tlhokomediso ho ntlafatsa tshebediso ya ditaba, thahasello le tsebo, di kopanywa le matsapa a ho kgothaletsa phihleleho e kgolo ya dibaka tsa S&T le diketsahalo, e ka lebellwa ho ba le phetoho e kgahlisang maamong a kgokahanyo ya saense.

**11**

RUTA SECHABA KA BOHLOKWA BA S&T YA KGALE

Ho hlokahala boiteko bo kopanetsweng ba puisano, ho tsebisa, ho ruta, ho keteka, le ho hlokomedisa batho ka lefapha lena le ruileng la S&T bakeng sa Sechaba se sengata.

Ditshupiso

Department of Science and Innovation (DSI) (2024) The South African Public Relationship with Science 2022 Survey Results. E hlophisitswe ke Human Sciences Research Council bakeng sa Department of Science and Innovation. Pitoria: HSRC








Department of Science and Innovation (DSI) (2021) Science Engagement Monitoring and Evaluation Impact Indicator Framework. E hlophisitswe ke Human Sciences Research Council for the Department of Science and Innovation. Pitoria: HSRC

Department of Science and Technology (DST) (2015) Science Engagement Strategy. E fihletswe ka Mmesa 2023, https://www.dst.gov.za/images/Science_Engagement_Strategy_-_SES.pdf








Department of Science and Technology (DST) (2019a) White Paper on Science, Technology and Innovation. E fihletswe ka Motsheanong 2023, https://www.dst.gov.za/images/2019/White_paper_web_copyv1.pdf

Department of Science and Technology (DST) (2019b) Science Engagement Monitoring and Evaluation Framework. E fihletswe ka Mmesa 2023, https://www.dst.gov.za/images/DSI_Science_Engagement_MEFFINALREPRONW3b_003.pdf

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Tswelo-pele Diketsahalo tse makatsang
 tshebediso ya kelello inthanete ya puisano
 saense ya mahlale metsi Lefatshe Disebediswa
 Marine Bonono le moetlo mehlodi kgwedi
 Potoloho Tswelo-pele menyetla e entsweng ke motho
 Dik' hemik' hale K' hosmetholoji Tlhahlobo
 e sa tlwaelehang Morafo tsamaiso ya letsatsi Boitshwaro
 Moriana bodumedi Diphoofolo boselamose
 Disaense tsa baeloji Dithapo ho ntlafatsa maphelo
 katleho Bohlale ba Morao-rao chelete nako
 Diasiti dimela diFomulara Ho chesa
 5G Dienjine 4IR Mello batho dintho tse phelang
 thekenoloji Khemistri e fihleleha Dintlha
 Bajaki dijo Sepakapaka Mocheso dilebo
 e utlwahalang Matla popo ya Modimo
 Diselefounu Dikgetho ditshepe Kgase
 Mafura tlholeho e rarahaneng Tikoloho
 e baka thahasello Diteko meaho mmele wa motho
 Boemo ba lehodimo e hanana le tlholeho
 Moya Bophelo ba letsatsi lefgatsheng ka bophara
 Diathomo Matla moloko mehopolo Ho hlwekisa

Ho banka Dintlha disebediswa tsa ditsebe
 Kgokelo Dikhamera Puisano madi
 tlhahlobo dikoloi HiFi marang-rang matla Moruo
 seya-le-moya ATM dijo Eskom
 Dik' homphutha sekgahla meaho
 GPS ho banka inthaneteng Disebediswa
 setofo sehatsetsi difounu saense aene dihufara
 WiFi thelefishini tsebo dimmapa LCD
 letsatsi mmino diterene inthanete ya puisano
 dinaledi disebediswa bohlale letsatsi
 disebediswa tshepe Kaho mochini
 diroboto bakganni ba difofane DNA
 ncha Moya diholokeramo kगतello diheke
 pampiri dipalo lebone Dijithale tlhahiso ya mesebetsi
 IR bokamoso Dik' hamphani disebediswa
 mehla Dik' hamphani ketlele kgolo
 bese Motlakase Dibomo AI mechini
 Temo Tsa motlakase sekgowa CD



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