

7KH DQDO\VLV RO HDLU\EDDQFH RQ 9\JRWVN\I  
/HDUQLQJ 7KHRU\

;LDQ\DQJ /LX

,QVWLWXW\ R8QGYXFDWLLV\ &ROOHJHDVRCRQRQ :%HGHRU BQLWHG .LQJGRP

\$EVWUDKFW VWXG\ DLPV KWR LQURRY LVGKH LVDFDQJ OF RQVLMULDYFWGRQVORSPH  
VWXGHQWV LQ D GLVWDQFH OHDUQLRQ RQ 9\JRWVN\IHDUQLRQ WKKHURUKJWRV BGE  
EDUULHUV WR OHDUQLQJ LQ GLVWDQFH RCH BBRQWJ R KW BDKHNLB SRQW  
OHDUQLQJ LQ WRGD\ V HGXFDWLRQ IZKFLQVWVKHJKLOLQGWVQJFWKWH GKH  
HQJDDJHPHQW DQG SRIRV OTHU SUG E ODPW LMD WWHPH QVQVUDO FRQFHUQ  
ZKLFK LV WKH SRQDGHGDKLWDFDFMDS WQRGRUR FRJQLWLYH GHYHORSPHQ  
OHDUQLQJ HQYLURQPHQW 7KH SXUSRVHDQDOKVHQWVWGH FVDFWLDQ HOHDK  
GLVWDQFH OHDBQLQJLWJRWVWHSWK WKKHURURORQGLSRORSBFRUGLQJO\

,QWURGXFWLRQ

7KH 6RFLDO GHYHORSHPHORSHTGKRU  
9\JRWVN\ GHVGHYHORSHPKHQWDO  
FKLOGUHQ V FRJQLWLRQWKKHURUKJWRV  
37KH WUXH GLUHFWRQ RI WKH GHYHORSHPHORSHTGKRU  
IURP WKH LQGLYLGXDO WR WKH SHULRUDO GHYHORSHPHORSHTGKRU  
WKH LQGLYLGXDO KHRU\ DVVHUWV WKH GHYHORSHPHORSHTGKRU  
FRJQLWLYH GHYHORSHPHQW DQG SRIRV OTHU SUG E ODPW LMD WWHPH QVQVUDO  
JXLGHG DQG PHGLDWHG E\ WKH SHULRUDO GHYHORSHPHORSHTGKRU  
WKHRU\ WKKHURURORQGLSRORSBFRUGLQJO\  
UDWKHU WKDQ DQ LQGHSHQGHHVDFDFMDS WQRGRUR FRJQLWLYH  
H[SDQGHG RQ WKLV E\ VWDWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
EHQHILWV IURP EHQHRSZIOGHGHEHQHROPHLQV LQ OLQH ZLWK 9\JRW  
PHPEHUVWKH FRPPXQLSDUHQWV OHDUQLRQFK UHIHUV WR WKKHURURORQGLSRORSBFRUGLQJO\  
WHDFKHWDFDWRQ RQ WKH OHDUQLRQDQG KKKHURURORQGLSRORSBFRUGLQJO\  
JUDGXDOVULVKHG DIWHU WKH RYHURORQGLSRORSBFRUGLQJO\  
HSLGHPLF FRPSDUDWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
FRPELQHG LQ VRFLHW\ HVSHFLDOORQGLSRORSBFRUGLQJO\  
ZLWK 9\JRWVN\QVRWKKHURURORQGLSRORSBFRUGLQJO\  
SURV DQFRQWHPSRUDU\ GLVWDQFH HGXFDWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
(YHQI ZH ZHURHHVFDSDWVHVZDORQGLSRORSBFRUGLQJO\  
WKKHURURORQGLSRORSBFRUGLQJO\ GLVWDQFH HGXFDWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
SOD\LQJ DQ LQFUHDVLRQ\ LPSODWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
HGXFDWLRQ V\WHP DQG WKH 29ORXUWELWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
XVDJH RI DFFHOJUWVWKKHURURORQGLSRORSBFRUGLQJO\  
ZRUOG IDPRXWDRQGLSRORSBFRUGLQJO\&RXUVHOD DV  
H[DPSON LQRU H[DPSONLQRU VWXGHQWV  
VLJQHGRKXUVRIQOERXUVHVLXWKKHURURORQGLSRORSBFRUGLQJO\  
LQFUHDVHURXEG PLOOLRQ SHU HDUURYHW WKKHURURORQGLSRORSBFRUGLQJO\  
WZRH DUV DFFHOJUWVWKKHURURORQGLSRORSBFRUGLQJO\  
SODWIRUPVHUD %XW ZLWK WKH RYHURORQGLSRORSBFRUGLQJO\  
HSLGHPLF WKKHURURORQGLSRORSBFRUGLQJO\ WKKHURURORQGLSRORSBFRUGLQJO\  
LQFUHDVH LQ QHZ UHJLVWUDWLRQV WKKHURURORQGLSRORSBFRUGLQJO\  
PLOOLRQ LQ DQG :KLOLVRQGLSRORSBFRUGLQJO\

IRXQGHU RI &RXUVHUD 'DSKQH . B B O HUD J K D G V R H Q W L R O V G D W K H U H V R X U F H  
DLP RI LW 32XU GUHDP LV WKD V G D Q R Q D J B U R X Q G W K H Z R U O G  
ZKR KDV DQ , Q W H U Q H W F R Q Q H F W Z R Q L S H S C K L F S W W Y R Q V D F P I R E L O H V H I L Q G  
G H Y L F H Z L O O E H D E O H W R O H D U Q J W K N W L K L Q J W K W O W Q H G E B W M B G E H R V O M D F U R P  
&RXUV W U H F K Q R O R J \ H Z R D E G H V W K E N Y L O F W L Y H O \ V X S S R U W V W K H G H Y H  
D F D G H B Q G V W H D F K H U V W R W H D E K I D O U L L Q J Q N P E B V D F R R Q J V W X G H Q W V  
V W X G H Q W V Z L W K R X W W K H F R Q V F K I D U Q H V R I R W G R I E D S W I L C L O F O F A H L M R L Q E H O V S O G G  
L Q D G G L W L R Q W R K L J K T X D O L W \ S O G M F D R W L P R Q F D Y Q D L R O V E H D Q R Z K U H U H Q J D  
D Q \ W L P H L W R I I H U V O H D U Q L Q J V M M B K U F O W G W X G H Q W L R E R I G R U X S W W K H  
H \ H U F L V H V Z L N L V Z D Q F K F P H M M X S F R Q W W Q X I P V W R H Y R O Y H W K H U R O H  
3 F \ E H U V R F L W \ F R P H V W R U H D S U R R R W L Q J O H D U Q L Q J L Q G H S H Q G H Q F H  
7 K H R S H U D W W H I R U \ K R Z G L O W D U Q F O Q N H O \ W R J U R Z V S H E F K Q L F O R D L F O D O D D G Y  
H Q D E V O K H D U Q R L D F K L H Y H I X U W K H I X U W K E V F I Q Q D Q H H D O V K H I I H F W E V E R K L O L L O V  
W R W K H F R Q F H S W R I R B \ S R W M L N P E G F E R V L R Q D O U H V R X U F H V  
G H Y H O R S P H Q W = 3 ' , I W K H R Q O L Q H J R W H D N F K V Q M K D R G \ O I H D D Q I R R J G L O O X V  
H Q Y L U R Q P H Q W S U R Y L G H V V X I I L F L M X Q G H Q W S \ R L Q G H E V I H Q G H Q H W M X Q H R P W W I K H J  
F D Q D F F R P S O L V K L V R V N P H Q Q W W I K I D W G H O K D W Z R Q O G Z K L F K I K H R O U V W R 3 : H X  
Q R W E H D E O H W R G R H R Q W I R H U L U R R Q F H L R Q G E R W H W B Z D U H Q H R V V R K H W K H  
S U R Y H Q W K D W L W L V W U X H Z L W K Q G K W K M X F F R Q W F R I R E R O G W V U F R Q V F L R X  
&RXUVHUD UHDFKHV PLOOLRQ S F H K L H W H I P H I Q G V X M H O F D U Q L Q J J R D O V W K U  
E \ W K H H Q G R I &RXUVHUD K G R D D U G H O G R D E D J H H P E O G L F L H Q W K R I 3  
G H J U H H V W B V O Z H D U Q H U V E \ & F R Q W F L R X V O G V R I S E R W G S E B E R O V M K D W  
U D L V H G D W R W D O R I P L O O L R Q R W R V V H M K D O X R W U D Q H L Q J W K H O I E H  
U R X Q G V U H J X O D W L R Q ) R U 9 \ J R W V N \ V H O I U H J  
, Q D G G L W L R Q W F R D O D W W U L E X W H Q W G R O W P I Q R O H O H D D W M H Q W L R Q W K F  
L V D J H R R G E Q V H Q G H S H Q G H Q W R O H D X Q G O P H E M F O X V H D W X U H R I K X P D Q E H K I  
L W \ V D U K L O B O M M U B O H Q L Q J S U D F W L F H L D O W D P H V R I W K H \ V W W H O F E I \ O H D D  
O H D U Q L Q J D O O R Z V V W X G H Q W V W R O P Z Y H P R X G H S V S R W R X Q W X G H Z L I R K R X  
I H H G E D F N U H I O H F W K R Q D O G G U R I Y E U H R Q R Z K L F K D U H V L J Q L I L F D Q W O \ V W  
U H I H U V W R V W X G H Q W L D U H I D U H L E R S O D D W F W A W G V H Q W R P S O H G W R O H D U Q L Q  
V H O H F W O H D U Q L Q J U H V R X U F H V W I Q R W F K U L U R X V D E W H S H O C Y H O P H Q  
D F K L M K H L U O H D U Q L Q J J R D O V Z K K F K O I O M D O O B M H P S O L P S S O W D Q W Q U F  
F K D Q F H W W R H H G R P F S V I I H U H Q W S M R S O M S Z K L R K W D V N V V W X G H Q W V S H U  
L V Y L W D O V L Q F H K L J K O H Y H O V B L O W D U Q R A U D O G H S H Q G M O X F H W Z L O W L F  
E H P R U H V X M F E O R Z O Y I R O V O H D U Q L Q J L Q W W R O G G H O V K H L Q W V R I G H F W L I R G  
L Q G H S H Q G H Q F H Q L Q H G L V W D R F H I H R Q F S R D O O P S D F W R Q W K H L Q W H G  
V W X G H Q W F E M Q V U F L G H D W H V W X G H Q W E H K D S R X U E D Q L Q V D F W I L R Q R U Z K I G F K E \  
D Q G O H D U Q L Q J D Q G X I S Y I O G H R I F W O H L O G Y I S H G G Q F W D Q F H O H D U Q L Q J  
' H S D U W P H Q W ( Q J L O H F W W Q F D D W W K H ) D F X O W \  
( Q J L Q H H U L Q J 1 D W L R Q D O 8 Q L Y H U V L W \ R I 6 X U D E D \ D  
, Q G R Q H V L D G X U L Q J R W K M K H U H S W G E O R F N D G W L R Q V  
V K R Z H G W K D W R I W K H V W X G H O W V I L O G V W K D W W K H  
G L V W D Q F H O H D U Q L Q J K H O S V W K S F W E L W K H F E H Q B L W D W R F L Q L G L W D G R E  
L Q G H S H Q G H Q F H D Q G W K E D O G L W D R O G G E F H O R S F L R O X J K 9 \ J R W V N \ V W I  
W K D W N L Q G V K F R Z N R I U H H F V I I H F W L Y H D Q D O W K L W K H K R Z H Y H U E R W K F X U U H Q W  
V W X G H Q W V R I \ R X Q V H O F H J H O R M O M U R O N \ V O H D U Q L Q J W K H R U I K D Y H W K  
J H Q H U D W M E R H Q G L Q J P R U H Q W W I P O G H R V O W W K H P R V W R E Y L R X V S U R E O H P L V G L V  
V R F L D O V R M K Z H U B U H \ P R U H F R P I F O D V V E R R P Z W W K H F O D V V E R R P Z W W K H  
R Q O L Q H D F W L Y L W L H V F O D V V E R R P Z W W K H F O D V V E R R P Z W W K H F O D V V E R R P Z W W K H  
O R U H R Y H U W K H L P S D F W R I L W D O H V V L P S D F M X G H O W H E O K D V Q U R M K H L C  
S D U W L F X O D U O \ S U R Q R X Q F H G D P R O J V R X Q J H U J H O H L E X W L Y ( V S H F L D O  
Z K R D U H P R U H D F G E V W J F P W I L Q J W W K H H Q G V L Y H P B Q L S X O D W L R O R U R I Y S I N U L I  
O D Q G V F D S H : L W K \ R X Q J H U L Q G L Y L G X D O W Q L G G E B O W D O G R O A N V I D E I Q H U V O H D U  
D P R X Q W V R I W L P H R Q O L Q H D Q G G Y L G F L D O P G H G D S O D W I F K F S I E O L Q  
W K H \ H \ K L E L W D J U H D W H U D I I L O K W T H S U T R O O G H O W H G W F D W L K E O U H T X L  
D F W L Y L W L H V 9 L O O D Q W L D Q G F B O O H G L Y W D Q E H O H D U Q L Q J K F D O G R O L  
W K L V W U H Q G Q R W L Q J W K H F R P I R U L U M D O G D E F O H G W K F K Z R U P D D W R P I  
\ R X Q J H U V W X G H Q W D G D S W W R D O G G W E B X J K H P R G E W K R O V L Q R G V % X W I  
O H D U Q L Q J H Q Y L U R Q P H Q W 7 K L V R W E R S H U O I P E N L O O V G H G V S U D G W L F D O  
L Q W H U D F W L R Q V W U D Q V O D W H V S U R S H U O I P E N L O O V G H G V S U D G W L F D O  
H I I H F W L Y H O H D Q B B L O H Q B E S H L Q J H V W X G H Q W V W R F X U U H Q W O R Q O D E N V O W B H C

HQJDVWXGHQWV LQ PHDQLQJIXO DQSTXKIDDOH QWUPOJ DFVHLOJLDM EHPV QW WR  
 WR SURPRWH WKHLU NQRZOHGJHV XDSRHOQWLVW QEBCEW V\JRHNDUNQ LQJ MRXU  
 ,QDGGGLWKRLOCH/WURQJ FBHWZGBWKLQV VFHQDULR HPSKDWIDJGFHWKHLQQ  
 WKH HIIHFWLYHQHV RI RQOLQHV QWUDUQHLQJHV QCG VPHQDFCEHV VPHKODHCHU W  
 LQWHUDFWLRQ ZKLFKWKXGDFQW MDRV SIKRZVZH QD WUDGLWLRQDO FODVVURF  
 NQRZOHGJH LV ODUJHO\ GHSHQHGHKXDWWRQ VWFHDFK HUP SOWRIGBQWDULHW\  
 LQWHUDFWLRQ 7KLV LV WKH LPSRLOVGDDEFGYRQ WLLRQ DOR DLDVCHVPHQW  
 FRQVWUXFWM GVVWVLP SXLQSRVIRQ VNOG UHVSRQVLYH OHDUQLQJ FRPPXQLV  
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 OHDUQLQJ ZKHUH VWXGHQWV DWHHJXODHU WRHIGKDFWH VZKHWLRIQV ROKLFK  
 QRW WR LQWHUDFW ZLWK WKH WRHDFKOH V WLP XODL QWUDVHSD RSRUOHSDH U9  
 HJWHQW WKDW WKHUH LV D ODFKHURH R FL DQ KIDGFLQWK HMDU FRZD WLVW C  
 OHDUQLQJ FRPPXQLW\ VWGRXODVODERQ R H S HFL DORX PHUHO\ D PDWVHU  
 OHDUQLQJQRW DWVHDFKLD DMLKQJW WKHDFKLQJ PHWKRQW KERXV KUWHXOL DHD S  
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 LQWHUDFWLRQ LV RQO\ WKURXJR IWGLV D DQHFVPHDQWQL Q Q G VZHXDQO Q HD C  
 EH DEOH WR DFFHVV WKH VWXGHQWVSLWH RI WKH OLPLDWDLRQ RI WK  
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 LQWHUDFWLRQ\ HWLGHQW D KLGGHURFRVWMLQV K D O H H P L S Q D X V L D Q H L B Q G  
 SLYRWDO DVSHFWK HRR UHG X K B V H J R Q D Q W S R U Z K P W F X W D L Q J H D O L D W H Q V R L Q H O \  
 VWXGHQWV DVVLPLODWH DQG DSRSDHNO B ZOMKGEWHRE VSR V BQ GLLDQWV O\  
 LQIOXHQFHG E\ WKHLU LQWHUDEMO RQYH Z LMKK D WIGDORVNLDFQV VFWRKUVLQ OH  
 SKHQRPHQRQ XQGHUVFRUHV WKH LRU YV J X B OG H RLOH V R L R Q K I R I V R R E I D D O L Q Y  
 FRQVWUXFWHG VWLPXOXV V\VWVSHFSRIVWK H GE HLQW 9ZDR WARKHLOJ B RH QZV W  
 WKHRU\ \$FRUGLQJ WR WKLV SHYLVSHFWWLYH WOH DSDQHQJL RLV QBRW XPH C  
 PHUHO\ DQ LQGLYLGXDO FRJQLV D VYK FSURK F WVR VE VMM XIGM V Q H R S D W Q K P D W H  
 HPEHGGHG ZLWKLQ DQG VKDSHGWEURRJKDD LQ EHHU D V S H L L Q V K R V H O R O H Q  
 XQLTXH QDWXUH RI GLVWDQFH ZLWKD V Q X G H Q V K L F Q R J U G H W W R D F K L H Y  
 VWXGHQWV WKH DXWRQRV\ WR ) K B R V H U P R K H O H Y R H V O N R I V F R Q F H S W  
 HQJDJHPHQW ZLWK WKHLU LQVWUXFWLRQ EUHLQDQV R W K V W L P D O I R U P V I R H  
 RSSRUWXQLWLV DQG FKDOOHQJH G H W L Q H D K L H V W R K W S W L P D O I R U P V I R H  
 7KH IOH[LELOLW\ LQKHUHQW LQ H R Q L Q Q H Q B D Q R R Q V I E R Q O V H D G W W E R F R  
 D GLYHUJHQFH LQ WKH LQWHQWLVW B R G W F X D O R W R R I O M Q H D F K G X F D W L R C  
 VWXGHQW LQWHUDFWLRQV :KLOSDRPRUPW X B D Q W W P D Q V R U P Y H L Q W K H  
 WKLV DXWRQRPRXV OHDUQLQJ LQWYHLURQV H R Q V F R M H D W L L Q J P D \ F \ E H U V  
 VWUXJJOH ZLWKRXW WKH GLUHQRUPQGD Q G J X H O D K R G W L P I X O Q J D R H P D Q W I  
 OHDUQLQJ FRPPXQLW\ 7KLV GBVSDVVM\ V F V G H B D G X W R H V D V W K D W V  
 GLPLQLVKHG VRFLDO VWLPXOXV OHDUQLQW RW K W R D J K S D J R W L V N L S D W L R Q  
 GHHPHG HVVHQWLOD D I R Q L Q J I H F D W M W F X L O D U O O Q Q V K R U W R I S U R Y L G L Q  
 GLVWDQFH OHDUQLQJ FRQWH[WIG X F Z K W R K V P R Q K R D V R V W K M K M L Y H L O W H  
 LPPHGLDF\ DQG LQWLPDF\ RI IDFHQW B Q D I F H O H O W G U O J V R X R V R P W K H 7 K L V C  
 SRWHQWLD O I R U U H G X F H G V R F L D O J G I L L F D H P V Q F W D L O V B Q J L H Q R I L D D S S W \ L Q  
 FRQFHUQ 7KH VRFLDO DVSHFWWKH GHHDWQQQDQGLYRPS D E P H Q W D W L R C  
 9\JRWN\ V WKHRU\ LV WKXV H R F S U R Q P V I Q V Z K Z I H W K H V K H G \ Q D P L F  
 GLJLWDO PHGLXP GRHV QRW ID F L L O L W L D W D U R H G O E W B R W O R I Q D S P R O D W U R  
 VXVWDLQHG DQG PHDQLQJIXO LQ V S H Q R D F K H L L R S R L E Q W Z N H D E W X I D F W K H V = 3'  
 DQG VWXGHQWV YDXXH DQG JHQHUDO IRU WKKHGIZ Q R O H  
 7KLV FKDOOHQJH ZDV YLYLGO\ N D O R Z O V B U D I H R S P L H O D W R X D E R S H V D W R Y H R Z  
 VWXG\ FRQGXFWHG E\ D 3DNLVW DWXIG H G H Q W D D H U F U H O D D H V G O H B R Q W E R P H V  
 RQH HGXFWRU KLJKOLJKWHG W K Q G Q S H F U I R V I P D Q R I H Y H D F G K I L V Q V W D B C E W W Z  
 WR VWXGHQWV ZKR DUH QRW Q DWKXU D O H D U L Q L F O L S H G F M R V S D W W I H F H S I D W E  
 DFWLYHO\ LQ WKH OHDUQLQJ SQRIFHVVDU K E \ R D E S H O L J F D R K S R V W R K D S S H F R L S  
 :H V K R X O G L Q W G H D F W Z K L R V D U H O B B W Q D Q W L G H V D E L O L W L H V S U R X H V W R V V  
 OLVWHQHUV UHIOHFWV D S U R D F X L W K H D S S R U R D F K Q R W W Q B I F K I V Q J D V O D W I  
 VHHNV WR EULGJH WKH JDS LQF X I O W X U R D S H Q W D V G K X O H \ H D F F N K O R A Z I C H J H  
 IXUWKHU QRWHV WKDW LQWHUDEW H R E Q O W S W D H G B R L L O Q S C W B D S W R K H R K J M R  
 DVVHVVPHQWV LQGLFDWLQJ D Q H H I C Q L R R U G B R G P W B V Y H P O V H X F Q G D V W K H  
 1RUWK \$PHULFD ZKR UHIXVH HGXFDF

